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PRACTICAL OBSERVATIONS
ON THE
INOCULATION
OF
C O W P O X.

PRAGMATIC OBSERVATIONS

ON THE

INNOVATION

OF

C. O. W. P. O. X.

PRACTICAL OBSERVATIONS

ON THE

INOCULATION

COWPOX.

POINTING OUT A TEST OF A CONSTITUTIONAL AFFECTION IN THOSE CASES IN
WHICH THE LOCAL INFLAMMATION IS SLIGHT, AND IN WHICH NO FEVER IS
PERCEPTIBLE.

ILLUSTRATED BY CASES AND PLATES.

By JAMES BRYCE,

MEMBER OF THE ROYAL COLLEGE OF SURGEONS, EDINBURGH, SURGEON TO THE
ORPHAN HOSPITAL, AND ONE OF THE SURGEONS TO THE INSTITUTION
FOR THE GRATUITOUS INOCULATION OF COWPOX.

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1802.

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Mr Chayne

With best wishes
from
The Author. —



TO

DANIEL RUTHERFORD, M. D.

PROFESSOR OF BOTANY;

THE FOLLOWING PAGES ARE INSCRIBED,

IN TESTIMONY OF

THE HIGHEST RESPECT,

AND

THE MOST SINCERE ESTEEM,

BY

THE AUTHOR.

THE HON. LORD MEADOWBANK,

THE REV. DR. BAIRD,

DOCTOR ALEXANDER MONRO, SEN.

ALEXANDER WOOD, ESQ.

JOHN WAUCHOPE, ESQ.

Directors of the Institution for the Gratuitous Inoculation of COWPOX, Established at the Public Dispensary of Edinburgh in February 1801.

GENTLEMEN,

THE INSTITUTION for the GRATUITOUS INOCULATION of COWPOX, of which you are the Guardians, is allowed to be one of great national importance; and the regulations by which it is conducted are such as reflect honour on you, and on those of the Public who are its Supporters. Already have upwards of six hundred persons been rendered

rendered secure against a disease, the most loathsome, pestilential, and dangerous to which human nature is subject; and reckoning according to the general mortality from smallpox in large cities, at least one hundred lives have been preserved to their Friends and to Society.

WHILE in other Institutions of a similar nature, the advantages resulting, are confined to those who are recommended by the Directors and the Subscribers, in your's the benefits are extended equally to all who apply; nor is it the poorer classes alone to whom this Institution is beneficial; the more wealthy throughout Scotland also partake of its advantages: For, from the Institution, the GENUINE Cowpox Virus is forwarded, almost daily, to Medical Practitioners in every direction; the obtaining of which is a circumstance of the very first importance, to ensure success from the Inoculation of Cowpox.

WHEN you, Gentlemen, did me the Honour to appoint me, along with Dr Farquharson, to inoculate

oculate at your Institution, I entered upon my public duty with an anxious wish to discharge it in a manner suited to the importance of the trust, and the greatness of the object which you had in view. An essential part of that duty I considered to consist in making such observations, on conducting the Inoculation of Cowpox, as might tend to elucidate farther that interesting subject; and having made such as it is thought may be useful for that purpose, I now make them public, in the hope that the advantages of the Discovery itself may thereby be more rapidly and extensively diffused.—May that hope not be disappointed!

I am, Gentlemen,

Your most obedient servant,

JAMES BRYCE.

*ST ANDREWS SQUARE, }
April 26. 1802. }*

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PRACTICAL



PRACTICAL OBSERVATIONS

ON

C O W P O X.

C H A P. I.

GENERAL HISTORY OF THE COWPOX.

S E C T. I.

*Of the Origin and Progress of Inoculation for the
Cowpox.*

THE Cowpox is an ailment which is readily communicated, by inoculation, from the cow to the human subject, or from one human subject to another under certain conditions; and, from all that has hitherto appeared, gives security to those who have undergone its full operation against one of the most loathsome and fatal diseases to which mankind are liable—the Smallpox.

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The history of the introduction of this new species of inoculation into medical practice, as a preventive of smallpox, is curious; and an accurate account of all the appearances produced, and of the effects operated upon the human constitution by this singular ailment, must be highly interesting and important.

It had been an observation long made in several of the dairies in England, particularly in those in Gloucestershire, that the milch-cows were frequently affected with an eruption upon their udders and teats, which was communicated not only from one cow to another, but frequently also to the hands of the milkers; and farther, that such of the milkers as had been thus affected, were never afterwards infected with smallpox, either by inoculation, or by exposure to the most virulent contagion of that disease, even although such persons had not previously undergone that dreadful malady.

It is curious that the knowledge of a fact of so singular a nature, and one of so much importance to the general interests of society, should have been, from time immemorial, confined almost entirely to those occupied in the business of dairies, without being fully investigated by such persons as could duly appreciate its value.

Dr Jenner, a physician in Berkley, in Gloucestershire, was the first person who set himself about examining this subject with that care and attention which its importance seemed to demand.

In the year 1798, after much diligent labour and investigation, Dr Jenner published “An Inquiry into the causes and effects of the Variolæ Vaccinæ,” in which he gave such an account of this most singular ailment, for it really is of so mild a nature as not to deserve the name of disease, as soon attracted the attention of, and astonished, the whole medical world. For a considerable time, the accuracy
of

of this account was received among medical men with hesitation. The character, however, of Dr Jenner, and the singularity and important nature of the ailment, led, as may easily be supposed, to farther investigation; and although many arguments were urged, and circumstances stated which seemed adverse to the plan of the general introduction of cowpox among mankind, yet the great utility of it at last was clearly evinced; and these investigations tended ultimately to confirm the observations of the accurate Jenner, and to establish the credit of this ailment, as a preventive of smallpox, on a basis too firm to be shaken by the shafts of envy, malice, or ignorance, the basis of immutable truth.

Dr Jenner, not satisfied with the assertions of the dairy farmers and servants, that persons who had been affected with cowpox were rendered thereby secure against the attacks of smallpox, determined to ascertain the truth of this fact by the test of experiment;

experiment: He inoculated for smallpox many persons who had formerly undergone the cowpox, some so long as thirty and even fifty years before; and these he uniformly found, as had been predicted to him, compleatly to resist that disease.

So far the nature of cowpox was known to others before it was known to Dr Jenner. In the year 1796, however, this ingenious gentleman pushed his investigation farther; and, on the 14th of May, he first intentionally infected the human constitution with the virus of cowpox, by inoculation, with the design, as he informs us, of observing more accurately the progress of the affection. The experiment succeeded; and the affection, though remarkably slight, was clearly marked in all its stages.

Dr Jenner next conceived the idea of inoculating this person with the virus of smallpox, in order to ascertain whether so slight an affection, as had taken place from cowpox, could possibly
give

give security from that dreadful disease. Several slight punctures and incisions were accordingly made in both arms, and the virus (of smallpox) was carefully inserted, but no disease followed. Some months afterwards the same person was again inoculated for smallpox, but still no sensible effect was produced upon the constitution.

This is to be reckoned the first discovery of the ingenious Jenner, respecting the nature of cowpox, viz. that the matter of cowpox, taken from the pustules on the cow, and artificially inserted into the human subject, produces an affection which, at the same time that it is more mild in its symptoms than that produced by accidental infection, does nevertheless still operate such a change upon the constitution as to render the person infected unsuceptible of smallpox.

Here the farther experiments of Dr Jenner, by want of matter to be employed in the prosecution of them, were prevented until the spring of the
year

year 1798, at which time the cowpox became again prevalent among the cows of the dairies in his neighbourhood, and afforded him an opportunity of investigating farther this interesting subject.

With matter taken from cowpox pustules on the teats of a cow, Dr Jenner now inoculated several persons; and from these persons he propagated the affection, also by inoculation, to others, even so far as the fifth change, without recurring to the original source, the pustules on the teats of the cow. The experiments were compleatly successful. The affection, in all those inoculated, was regularly produced. All the persons that had been thus infected were afterwards subjected to inoculation with the virus of smallpox, but ineffectually, no disease in any instance succeeding to this operation. The following is the report of Mr Henry Jenner to Dr Jenner on this important point. ‘I have inoculated, for smallpox, Pead and Barge, two of the boys whom you lately infected with cowpox. On the second day, the incisions were inflamed; and there
‘ was

‘ was a pale inflammatory stain around them. On
 ‘ the third day, these appearances were still increas-
 ‘ ing, and their arms itched considerably. On the
 ‘ fourth day, the inflammation was evidently sub-
 ‘ siding; and, on the sixth, it was scarcely percep-
 ‘ tible; no symptom of indisposition followed *.’

From these experiments, we derive another most important discovery concerning the nature of cowpox, viz. that the virus of cowpox may be propagated from one human subject to another, through several gradations, and still retain the power not only of producing the affection regular in all its stages, but also of rendering those constitutions which are infected secure against the attacks of smallpox.

By unwearied attention to all the circumstances under which he was accustomed to observe this ailment, Dr Jenner was led to conclude,

That

* Jenner’s Inquiry, p. 43.

That persons who have already had the smallpox are still susceptible of the action of cowpox, though not to such a degree, as those who have never been subjected to that of smallpox.

That in cowpox, no eruption takes place unless on the part where the virus is applied to the skin.

That cowpox, even under the most unfavourable circumstances, has never proved fatal.

That cowpox cannot be propagated by contagion, but only by actual contact, or inoculation, with the virus.

That the virus of cowpox inserted into the human body may produce an affection which is merely local, the general constitution remaining unaltered, and that in such cases the person is still liable to be infected with the smallpox.

Soon after Dr Jenner's publication appeared, viz. in November 1798, Dr Pearson of London published "An Inquiry into the history of cowpox, principally with a view to supersede and extinguish the smallpox." In this treatise, the positions and conclusions of Dr Jenner are examined with that candour and attention which their importance demand. The evidences adduced are numerous and respectable, and the result is highly favourable to the general introduction of inoculation for cowpox among mankind, not only as a preventive of smallpox, but also as a certain mode of ultimately extinguishing that loathsome malady.

In May 1799 were published, "Reports concerning a series of inoculations for cowpox, with remarks and observations on this disease considered as a substitute for smallpox, by Dr Woodville physician to the smallpox and inoculation hospital in London." The account here given by Dr Woodville is very different from that given by Dr Jenner, and by no means favourable to the general

ral introduction of the new inoculation as a substitute for smallpox. Such a report, coming from a man of Dr Woodville's known character and reputation as an accurate observer, naturally produced a strong sensation on the minds of medical men concerning the discoveries of Dr Jenner. The circumstances, however, under which Dr Woodville's observations were made, and upon which his reports were founded, were such as led him to be much deceived concerning the true nature of cowpox. As this will be clearly pointed out in the following pages, I shall at present avoid entering into the particulars.

This report of Dr Woodville, so very different from the general statement of Dr Jenner, naturally called for a reply from the latter, who accordingly, in 1800, published, "A continuation of facts and observations relative to the Variolæ Vaccinæ." In this publication, Dr Jenner is anxious to recover his favourite subject from that degree of shade which had been thrown upon it by the hasty reports

reports of Dr Woodville; and this he appears to have done with great success, both by farther observations of his own, and by the concurring evidence of many respectable correspondents.

In the mean time the practice of inoculation for cowpox gradually became more general; and it is a strong proof of the accuracy of Dr Jenner's opinions concerning this ailment, and of its superiority over smallpox, that the more it was practised, and the more narrowly all the facts concerning it were observed, in so much the more was it preferred, as certainly productive of all the advantages which had been described.

In order that the poorer class of mankind might reap equal advantages from this important discovery, as the more rich, and that all ranks might have an opportunity of co-operating for the general good of society in accelerating the extermination of smallpox, public institutions were soon established in most of the great cities in England, where gra-
tuitous

tuitous inoculation for cowpox was to be performed to all those who should apply. Charitable institutions of the same kind have also been established in many of the towns in Scotland; and in all these the success of the new inoculation has been such as to equal the most sanguine expectations of the discoverer. Nor is it to the inhabitants of Britain alone, that the advantages arising from the inoculation of cowpox are confined; in the sister kingdom it has also been practised with equal success; from France likewise, from Germany, Holland, America, the West Indies, &c. &c. reports are daily arriving, proclaiming the efficacy of cowpox as a sure preventive of smallpox, and pronouncing blessings on the head of the thrice happy Jenner.

S E C T. II.

Of the Origin of Cowpox.

SOME have asserted, that the cowpox is not generated in the constitution of the cow, but produced on her by inoculation with certain diseased fluids of the horse; while others are of opinion that this ailment is truly vaccine, being generated solely in the constitution of the cow: Of the former opinion is Dr Jenner.

The horse, it is well known, is subject to an inflammation and swelling in the heels, which is called the grease, from which, at a certain period of the

the

the affection, there issues a very acrid thin matter ; and this applied to the udder or teats of the cows, Dr Jenner supposes, gives rise to a pustular affection on those parts, which is the cowpox.

The matter issuing from the heels of the horse under greafe, is supposed to be conveyed to the udder and teats of the cows, in the dairy farms, by the men servants, who there generally assist in milking : Thus, one of these, having previously dressed the heels of the horse, goes immediately to bear his part in milking ; and, having some particles of the discharge from the greafe upon his hands, applies it to the udder and teats of the cow, where, if the animal be in a proper state for receiving the infection, it produces a particular action in the parts, giving rise to those vesicles which constitute cowpox. Dr Jenner grounds this opinion upon a general observation among those employed in dairies, viz. that the cowpox affection among the cows is always observed subsequent to the prevalence of the greafe among the horses.

Against

Against this opinion of Dr Jenner concerning the origin of cowpox, it is argued, that experiments have been made by Dr Woodville and by Mr Coleman with much care and attention, in order to produce cowpox, by directly inoculating the udders and teats of cows with the recent matter of greafe from the horfe, but that, in no instance, have they been fucceffful.

Again, it has been found by Dr Pearfon, that the cowpox has broken out on a farm where no infected cows had been introduced among the herd, and where the milkers had not been liable to have their hands infected by the matter from the heels of horfes under greafe, nay, where there were no horfes kept upon the farm.

Doctor Woodville has alfo inoculated human fubjects with the recent matter of greafe from the heels of the horfe, but could not by this means produce cowpox.

Thofe

Those who have thus argued against the opinion of Dr Jenner, have attributed the origin of cowpox to certain unknown changes in the constitution of the cow, owing probably to the season of the year, or to a change from a less to a more nutritious diet, as happens in the spring season.

Adverse as these things may appear to the opinion entertained by Dr Jenner concerning the origin of the cowpox, more late observations seem to declare in his favour, and to confirm his position, that the cowpox is actually produced in the cow from inoculation with diseased fluids of the horse.

In the Medical Journal for November 1800, is a letter from Sir Christopher Pegge, from which it appears that there is a disease affecting horses which is considerably different from, but which, however, may have been confounded with, the grease. This disease is called by farriers *Scratchy-beel*; and Sir Christopher observes, on the authority of Mr Lupton surgeon at Thame, that the matter thence issuing,

on being applied to several persons, had produced in them a disease every way similar in appearance to the cowpox ; also, that this matter from the horse had produced the disease on the cow, and from her again it had been regularly communicated to several persons. At the time this letter was written, however, it does not appear that any of the persons thus infected had been subjected to inoculation for smallpox, so that it was merely the appearance of the affection that Sir Christopher and Mr Lupton trusted to in their observations.

In October 1801, Dr Loy, physician at Aislaby, published an account of some experiments conducted by him, in order to ascertain the true origin of the cowpox affection on the cow. These experiments appear to me to have been conducted with judgment and with attention ; and I am not at present aware of any reason why they should not be regarded as conclusive on this point. Doctor Loy informs us, that he had made several unsuccessful attempts to produce any appearances of cowpox,

either

either upon the cow or upon the human subject, by the application of grease-matter as obtained directly from the heels of the horse ; “ at length,” adds he, “ I had the good fortune to meet with one horse, from whose heels I procured the matter of grease in a more limpid state than that obtained from any of the others, at about the fourteenth day of the disease, and a week from the first appearance of the discharge. The matter from this horse produced the disease in Experiments IV. and VI. and also in three cows, whose cases I have not particularized, as the appearances were similar to experiment IV. and as no farther trials were made from them.”

The following are some of the experiments of Dr Loy on this important point.

EXPERIMENT IV.

“ Some of the thin limpid matter that issued from a sore in the heel of a horse affected with the grease,
was

was inserted, by a perfectly clean lancet, immediately after its being procured, into the teat of a cow. On the fifth day, the wound appeared rather elevated, and a faintish redness surrounded it. In a few days, a vesicle formed, containing a large quantity of watery fluid, and of a purple tinge. Though the inoculated part was tumified and painful, the animal did not seem otherwise diseased."

EXPERIMENT V.

"A quantity of limpid matter, obtained from the teat of this cow, was inserted into the arm of a child. On the third and fourth days, the incision appeared without any evident signs of having received the infection; but, on the sixth day, a considerable degree of redness surrounded the wound, and a vesicle was formed on the ninth day, when the child was inoculated with the smallpox virus in different places, and in such a manner that there could not be the least doubt of communicating the infection,

infection, was the constitution capable of receiving it. The child, however, continued free from any topical or general symptoms of the smallpox.”

EXPERIMENT VI.

“ Some grease-matter, obtained from the same horse, was inserted into the arm of a child. On the third day, a small degree of inflammation surrounded the wound. On the fourth, the inoculated part was much elevated, and a vesicle of a purple colour was formed on the fifth day. On the sixth and seventh, the vesicle increased, and the inflammation extended and became of a deeper colour. On the same day a chilliness came on, attended with nausea and some vomiting. These were soon succeeded by increased heat, pain in the head, and a frequency of breathing: the pulse was very frequent, and the tongue was covered with a white crust. When in bed, the child was much disposed to sweat. By the use of some medicines,

and

and exposure to cool air, the feverish symptoms soon abated, and disappeared entirely on the ninth day. On the sixth day, smallpox matter was inserted into the same arm in which the matter of grease had been placed, but at a considerable distance from it. On the fourth and fifth days of the smallpox inoculation some redness appeared about the wound; and on the sixth, a small vesicle. The inflammation now decreased; and, on the ninth day, the vesicle was converted into a scab."

EXPERIMENT VII.

" On the sixth day of inoculation, and previous to the insertion of the smallpox virus, matter was procured from this child, and five others were inoculated with it. From the remoteness of the situation, I had not an opportunity of seeing them until the tenth day of the inoculation; on that day, an extensive erysipelatous efflorescence surrounded the vesicles which were now beginning to dry, but
still

still contained a considerable quantity of limpid matter. On the tenth day, they were all inoculated for the smallpox in the arms free from the former inoculation. Nothing appeared from the insertion of the variolous matter except a very small degree of inflammation, which vanished on the fifth day.”

These experiments afford us new cause for admiring the accuracy of Dr Jenner’s investigations: From them, and the farther observations of Dr Loy, we are led to conclude,

1. That there are two kinds of greafe, as affecting horses, differing much from each other in the power of giving disease to the human or brute animal.
2. That one of these is a general as well as a topical disease, being evidently attended with fever, and, at a certain period, with an eruption upon
the

the skin; while the other is merely a local affection.

3. That it is the matter issuing from the heels of the horse affected with the former of these kinds of grease only, at a certain period of the affection, and while in a limpid state, that possesses the power of communicating disease to the human constitution, or that of brute animals.
4. That the disease thus communicated, whether by direct inoculation with the matter of the grease as issuing from the horse, or after it has been regenerated in the constitution of the cow, secures the person who has been infected from all future attacks of smallpox:—In short, that this is the Cowpox.

S E C T. III.

Description of the Cowpox.

THE cowpox, when produced in one cow, is observed to spread with considerable rapidity among the herd, not by means of contagious effluvia, but by the matter of the vesicles being carried from one cow to another by means of the milkers. This singular affection makes its appearance generally in the spring season; and is observed upon the udders and teats of the cows, at first in the form of small vesicles containing a limpid fluid. These vesicles are of a bluish or livid colour, and are sur-

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rounded

rounded with considerable swelling and inflammation, seemingly of an erysipelatous nature. By degrees, the vesicles become irregular about the edges, and, unless care is then taken, are very apt to degenerate into foul and troublesome sores: During this course of the affection, the cow is frequently observed to be considerably disordered, the appetite is impaired, she is found to be hot, and the secretion of milk is considerably diminished. It is observed that cows may be frequently affected with this disease; but the first attack of it is always the most severe. The farriers and cow-doctors cure the foul ulcerations, into which these vesicles often degenerate, by the application of strong escharotics.

The matter issuing from the vesicles upon the udders or teats of the cows, when it falls upon the hands of the milkers, and more especially if the cuticle happen to be abraded at the part on which it may chance to lodge, very certainly infects those milkers. When the ailment is communicated
in

in this way, it is called the casual cowpox, by way of distinguishing it from another mode by which it is now intentionally propagated among mankind, viz. inoculation; and it is observed, that the affection is always more severe when it takes place by the former mode, than when communicated by the latter. This difference, however, may most probably be owing to the greater number of vesicles which generally appear in the casual cowpox, from the virus having been applied more extensively, or to a greater number of distinct points on the surface of the body, than in the inoculated cowpox: For on each of these points will be formed a vesicle; and this greater number of vesicles will of course produce not only a greater degree of pain, swelling, and inflammation of the affected member, but most likely also a greater degree of fever will follow than where one or two vesicles only are formed, as in the case of inoculated cowpox.

The

The local situation of the pustules may also have considerable influence in producing a more severe affection. This will be allowed, when we consider, that inflammation affecting tendinous parts, as about the hands, is more painful, and also more apt to degenerate into foul sores, than where it is confined to the softer skin and cellular membrane.

When the cowpox has been communicated to the milkers in the casual way, small inflamed spots appear in a few days upon the hands, more particularly about the joints and tips of the fingers. These spots quickly assume the appearance of small blisters, somewhat resembling those from burns, which go on increasing until they become large vesicles of a circular form, with a flat or rather a concave surface, their edges being considerably elevated above their centre. They have now acquired a bluish colour, nearly, but not exactly, resembling those upon the cow, and are found to contain a limpid fluid. After some days, the parts around the base of these vesicles become considerably swelled,

ed, hard, and inflamed, and, as the affection advances, assume much of an erysipelatous appearance. Pain and some degree of swelling of the glands in the armpits now denote an absorption of the virus; and the usual symptoms of fever supervening, mark a constitutional affection, which is sometimes so severe as to incapacitate the person from following his usual employment for some days. It does not however appear, that ever, even in the smartest attack from the casual cowpox, any eruption on the surface of the body succeeds to the general or constitutional affection.

After a few days, the pain, inflammation, and hardness of the surrounding parts gradually abate; but the vesicles, in place of drying up kindly, very frequently, as before remarked, run into foul and troublesome ulcerations. These ulcerations, however, are generally cured without occasioning any lasting injury; and the constitutional affection, although severe, is always transient and unattended

tended with danger, there being no instance on record where this has been known to prove fatal.

To those employed in dairies, it is well known that the same person is liable to repeated attacks of the casual cowpox, but the succeeding attacks are always lighter than the first. It is also known, that a person having undergone smallpox does not thereby become exempt from the action of the virus of cowpox; in such cases, however, if the ailment be produced, it is also a more light, and perhaps merely a local, affection.

In the cowpox, as induced by inoculation, there are some appearances which are considerably different from those which have been described above, as occurring in the casual disease; and as it is highly probable that it is under this form in which cowpox will chiefly become the object of medical practice, we shall now proceed to consider more particularly the progress of that affection when propagated by inoculation.

About

About the third day after the insertion of the virus of cowpox, either by puncture or by slight incision in the arm, a small inflamed spot may be observed in the part where the inoculation was performed: Next day, this spot appears still more florid, especially if the person be warm; and by passing the point of the finger over it, a degree of hardness and swelling in the part is readily perceived. On the fifth day, a small pale vesicle occupies the spot where the inflammation was, and the affection begins to assume the characteristic appearance of cowpox. In place of inflammation, extending around the base of the vesicle, at this period, as is common in smallpox and most other pustular diseases, the whole has a milky white appearance. The vesicle is now turgid, but evidently depressed in the centre, while the edges are considerably elevated. For the next two days the vesicle increases in size, and retains the same character, so that by the seventh it has acquired very considerable magnitude, and is of a circular form if the inoculation was performed by a puncture, or of an oblong form if done by an incision;

cision; but in both cases the margin is regular and well defined, while the centre, becoming still more depressed, and a small crust forming there, and the edges becoming more turgid, give the whole a very particular appearance and character, which, in my opinion, may readily serve to distinguish this affection from every other.

The structure of this vesicle, as may be perceived at this period, is singular, and very different from the structure of the pustule which occurs in smallpox. In smallpox, the whole fluid of the pustule is contained in one entire or undivided cavity, and may be all readily evacuated by one small puncture. In cowpox, however, it is very different, for here the vesicle is greatly subdivided, or is composed of many cells, the whole somewhat resembling a honeycomb, with a general covering from the cuticle.

About the eighth day from the time of inoculation, inflammation begins to appear around the base of the vesicle. This increases for two or perhaps three

three days more; and, when at the height, the inflamed part is quite circular, and from half an inch to two inches or more in diameter. This inflamed circle, or areola, acquires an erysipelatous brightness, and the whole, more especially the part contiguous to the vesicle, feels very hard and tense. At this period also, the vesicle still retains the concave appearance, the crust in the centre has considerably increased in size, and begins to assume a dark or brownish colour, while the turgid edge assumes more of a shining appearance, as if the contained fluid was passing into a purulent state. About the eleventh day, the vesicle has attained its greatest magnitude, and then the surrounding inflammation and hardness begin to abate: and it is curious to observe, when this takes place, that the redness generally disappears first from the neighbourhood of the vesicle, and thence gradually towards the edge of the areola, often leaving at the last a complete but slender florid ring or circle of inflammation, marking the circumference of the faded areola, the inner part having changed to a dingy

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yellow.

yellow. The fluid in the vesicle, which was before very thin and transparent, is now more viscid and slightly turbid, and, after this period, the whole is quickly converted into a smooth, shining, and somewhat transparent dry crust, of a dark brownish or red colour. This crust, unless forcibly removed, will remain upon the part for one or sometimes two weeks, and then fall off, leaving the parts underneath quite sound and entire.

This, then, is the general course of the affection as it appears at the part inoculated; and, in the greater number of instances, especially in children infected with this ailment, little more is to be remarked: in some, however, and particularly in adults, marks of a constitutional affection are common.

About the eighth day from the time of inoculation, the glands in the axilla become a little swelled, occasioning pain and stiffness on moving the arm. Headach, shiverings, a frequent pulse, and
other

other febrile symptoms take place ; and these have been observed to continue from a few hours to two or more days. These symptoms, however, are in general so flight and transient as to require no aid from medicine.

S E C T.

S E C T. IV.

*Of Varieties which sometimes occur in the course of
Cowpox.*

HAVING mentioned the usual course of the phenomena as they appear in cowpox; it is now to be observed, that considerable variations from this course occasionally take place, which, however, make no real difference in the nature of the ailment. Thus, the vesicles and circles of inflammation, in some cases, attain to their full height two days sooner or later than the period above mentioned. Also, if the vesicles have been broken,

broken, or the crusts forcibly removed, about the tenth day, an ichorous matter is poured out, and will continue to be discharged for some time; or a scaly matter may be formed over the sore, whereby it will be prevented from healing for a very considerable time. Sometimes also the sore, after this period, is apt to degenerate into a foul and troublesome ulcer.

A copious eruption of very small pimples is frequently observed upon the inoculated arm, about the third day after the operation. These always subside or vanish spontaneously in a day or two; and this appearance is so far from being alarming, that I am always well pleased to observe it, regarding it as a certain sign of the infection having taken place. This eruption I have generally observed to be most abundant on the fore arm; and I suppose with others that it must be attributed merely to the effect of local irritation.

Another,

Another, and a very important circumstance, has been described by many as a variety occurring in cowpox ; I mean, an eruption more or less plentiful of well defined pustules over the whole body, which are said to run their course regularly, and become filled with a fluid which possesses the property of producing a similar disease by inoculation. But as an eruption of pustules, in consequence of the constitutional affection of cowpox, does not always take place, and is not necessary, according to the observations of Dr Jenner, to secure the person infected from the future attacks of smallpox ; and as the cowpox has, according to the opinion of Dr Woodville and some others, been, from the presence of these, converted into a severe disease, it becomes a point of much consequence to investigate the nature of these eruptions, in order that, if they are found really to belong to cowpox, their cause may be avoided.

It must be allowed that there is scarcely any person, who has had much practice in the cowpox inoculation,

culation, who has not met with cases where an eruption, of pustules, more or less numerous, has taken place during the course of the affection; and much has been said and written concerning the nature of these. Some, from observing this supposed variety of cowpox, have reprobated the introduction of such a disease among mankind, as one fully as severe as that which it was meant to prevent; while others contend, that these eruptions are altogether foreign to the cowpox, and owing entirely to accidental circumstances in no way connected with that affection. That this is really the case will, I apprehend, clearly appear from an attentive consideration of the following pages.

We are told that a great many of the persons who were first inoculated by Dr Woodville for cowpox, were affected with eruptions so numerous, and which ran a course so similar to the pustules of smallpox, that, as he informs us, "he could not discriminate between them;" and it was in consequence of this, that his report formerly alluded

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ed to, which had been drawn up from these cases, was so adverse to the introduction of cowpox inoculation among mankind as a preventive of smallpox. I shall state Dr Woodville's own words on this point; and then make such remarks on his report as my own experience and that of others suggest, in order to detect the source of his deception, and to determine what ought justly to be concluded from his experiments respecting the true nature of these varioliform eruptions.

Dr Woodville, in his reports on cowpox, has given a table showing how many persons out of the number he inoculated had pustules, and the number of pustules which appeared upon each individual.—From this table we learn, that 500 were inoculated, a very great majority of whom had pustules, and that, in many, the number of these amounted to about one thousand.

“ This table,” he observes, “ contains a sufficient number of cases to enable the medical reader
to

to form a tolerably correct judgment respecting the disease; and, from considering what would probably have been the effects of an equal number of cases of variolous inoculation, he may draw his own conclusions. But before this is done, I have to observe that, since the table was composed, one infant, on the breast, died on the eleventh day after the matter of cowpox had been inserted in its arm. In this solitary instance, the local tumor was very inconsiderable, and the eruptive symptoms took place on the seventh day, when the child was attacked with fits of the spasmodic kind, which recurred at short intervals with increased violence, and carried it off at the time above mentioned, after an eruption of 80 or 100 pustules."

" It appears, therefore, that out of five hundred cases of inoculated cowpox, one proved fatal; and the preceding table shows, that in some others the disease, *from the number of pustules*, was of formidable severity; while, on the other hand, a very large proportion of the patients were scarcely

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disordered from the inoculation, and had no pustules.”

“ Were I enabled,” continues he, “ to state a number of cases of variolous inoculation, equal to those given above, and reduced to a similar tabular form, the comparative magnitude of the two diseases might be estimated with tolerable precision. It is evident, however, that the matter of the vaccine disease has generally produced much fewer pustules and less indisposition than that of small-pox ; for it appears, from the preceding statement, that about two-fifths of all the persons inoculated for the *variolæ vaccinae* had no pustules, and that in not more than a fourth part of them was there experienced any perceptible disorder of the constitution.”

“ But, it must be acknowledged, that in several instances the cowpox has proved a very severe disease; in three or four cases out of five hundred, the patient has been in considerable danger, and one
child,

child, as I already observed, actually died under the effect of the disease. Now, if it be admitted that at an average one in five hundred will die of the inoculated cowpox, I should not be disposed to introduce this disease into the inoculation hospital, because, out of the last five thousand cases of variolous inoculation, the number of deaths has not exceeded one in six hundred. But, adds he, “ I am inclined to think, that if the matter of cowpox used for inoculation was only taken from those in whom the disease appeared in a very mild form, the result would be more favourable than in the statement here given ; for, though it has occasionally happened, that the matter taken from the arm of a patient, in whom the disorder neither produced fever nor eruption, has in others produced both, yet still it has much more commonly had the effect of exciting a more mild disease than the matter of the pustules, or than that which was obtained from a patient who had the disease in a severe manner, as may be seen by an examination of the table. Thus, we find, that out of sixty-two persons

sons who were inoculated with the pustular matter, fifty-seven had an eruption ; and those who received the disease from any of those fifty-seven, appear also to have had pustules in nearly the same proportion. I may also remark, that the disease before mentioned, as proving fatal to a patient, was excited from matter of this description. Whence it appears, that the cowpox, from certain circumstances, is not only liable to lose the characters which distinguish it from smallpox, but also to propagate itself under this new and casual modification. The vaccine disease and the human variolæ ought therefore," he concludes, " to be considered as only varieties of the same disease, rather than as distinct species *."

This

* Reports of a series of inoculations for the Variolæ Vaccinæ or Cowpox, with remarks and observations on this disease, considered as a substitute for the Smallpox ; by William Woodville, M. D. Physician to the Smallpox and Inoculation Hospitals, page 149, *et seq.*

This report of Doctor Woodville, was there no mistake in the case with regard to the disease which prevailed, would of itself be quite sufficient to prevent the general introduction of cowpox inoculation as a succedaneum for smallpox ; and I have been thus careful in detailing his sentiments conveyed in it, first because, considering the quarter from whence it comes, it is the strongest evidence that has yet appeared against the cowpox, and one where all the particulars upon which it is founded have been more accurately stated than in any other which I have met with; and, secondly, because I am of opinion, that, on attentively considering the circumstances under which it was formed, and comparing those with what has occurred to myself and others employed in cowpox inoculation, I shall be able to evince, that the severity of the symptoms was entirely owing to causes quite unconnected with cowpox.

In order to do this, it is necessary for me to state the following fact, which has been frequently observed

served by myself and others, who have had much experience in the practice of cowpox inoculation.

If a person who has neither had the cowpox nor the smallpox be exposed to the contagion of the latter, and is soon afterwards inoculated for the former, the inoculated affection may advance in a perfectly regular course, at least so far as the local appearance can indicate, and still, at the end of such a number of days, as may be necessary for the smallpox contagion to show its effects upon the constitution, the person may sicken and go through the disease of smallpox with an eruption of pustules, more or less numerous, according to circumstances.

The following history of vaccination in a family that applied at the Public Dispensary for inoculation, while it illustrates this is also highly interesting and instructive.

J. Nelson brought three children to the Edinburgh Public Dispensary to be inoculated for cowpox,

pox, on Wednesday the 18th of March 1801. The operation was performed on each; and the arms of all soon showed the usual appearance of the virus having taken effect.

The vesicles were formed and advanced with perfect regularity; and, on the 27th, the oldest of the three (James) was brought to me for advice at my own house. The affection on the arm had the areola well formed, and appeared every way well advanced for the period elapsed from inoculation, and the vesicle was quite characteristic of cowpox. The mother informed me, that for two days he had been very feverish, and that his sleep had been much disturbed with startings; his pulse was then unusually frequent; his skin hot, and tongue white. It was ordered that he should have a brisk purge, and be kept very cool. On the morning of the 30th, he was again brought to me. The mother then informed me that the fever had continued until the morning of the 29th; during which day she had observed several small pimples to appear upon his

his face and body, which were, at the time of my seeing him, (on the 30th) very conspicuous, and certainly had much the appearance of smallpox. On the same day, the 30th, Jean Nelson, another of the three, was also brought for advice. On the 28th, she had been attacked with a smart fever, which still continued when I saw her; and an eruption resembling that on her brother, but greatly more numerous, appeared also on her, during the night of the 29th.

On examining her arm, the cowpox affection appeared to have advanced quite regularly, and there was, at that time, an uncommonly large inflamed and hard areola. The mother, on being questioned, denied that the children had been, at least to her knowledge, exposed to the contagion of smallpox. Regular reports of these cases were daily marked; and it appears, from them, that the pustules on the bodies of both children advanced regularly to maturity, after the manner of variolous pustules; and that their appearance, in every respect,

respect, left not the smallest doubt, on the minds of many medical men who saw them, that they were the genuine pustules of smallpox.

Both the cowpox affection on the arm, and the smallpox eruption, advanced regularly; and, on the 16th of April, the report is as follows: James and Jean Nelson both convalescent. The father, who had hitherto also denied his knowledge of the children having been exposed to the contagion of smallpox, now made the following voluntary confession. "You, Sir, have always suspected that the children had been exposed to the smallpox, and indeed I was afraid to confess it, so long as they remained ill, for fear they might have died, and I should have got the blame; but, to tell the truth, I took the boy along with me to a house in the Cowgate, where there was a child ill of the natural smallpox, on the Sunday (the 15th) before he was inoculated for cowpox; and I have no doubt but he might have been infected at that time, and perhaps also brought the disease to his sister." The remaining child has

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gone

gone regularly through the cowpox affection; she has had no evident fever, but nevertheless has entirely escaped the smallpox, although she has eat and slept with the other two children during the whole time they were ill of that disease. On the 30th July, this third child still continued free from smallpox.

Here it is perfectly clear, that the smallpox contagion must have been lodged in the system a considerable time before any action from the cowpox virus took place. The boy must have been infected directly on the 15th, and he or his father may have carried the infection to the sister, for it is perfectly ascertained that none of the family were again exposed to the smallpox contagion after that period. It seems somewhat extraordinary, however, that the cowpox affection should have advanced with such regularity; and that, at the very time of the eruptive fever of smallpox, the marks which have hitherto been regarded as denoting a constitutional affection in cowpox, viz. the inflamed and hard areola,

areola, should also have been in perfection. In these two cases, and in several similar ones which have since fallen under my own observation, there appears to have been two diseases present, viz. the smallpox as a constitutional disease, and the cowpox as a mere local affection.

Now, to apply these observations to the cases of Dr Woodville, I would assert, that in every instance where eruptions appeared in his practice, as detailed in his tables, at least when they were in any considerable number, and, as he observes, “not to be distinguished from the common variolous pustules,” the general constitutional disease was, as in the cases of the two Nelsons, the smallpox. It will be recollected, that all those cases were inoculated at the “Inoculating Hospital,” where the patients were necessarily, for some time, exposed to a state of the atmosphere completely variolated, or loaded with the contagion of smallpox; what wonder then that they, like the Nelsons, should be infected with that disease? It appears also, that many
were

were actually inoculated with the virus of smallpox, in place of the virus of cowpox as was intended, for the matter was taken from pustules on the body, and produced a pustular disease on the 7th and 8th days from inoculation. In a future publication, Dr Woodville mentions his suspicions, that these pustular cases might be owing to some *modification* of cowpox from the presence of a variolated atmosphere; because he found, that when he inoculated patients in different parts of the city, with the same stock of cowpox virus, such patients had the affection in its mildest form; and, on the other hand, that in a village near London, where the smallpox was frequent, eruptions, during the course of the cowpox, also frequently appeared. “From this circumstance I suspect,” says the Doctor, “that where the smallpox is epidemic, the cowpox will be found to be equally liable to excite pustules as in the hospital.” He adds, “But in what way the variolous miasma acts in thus *modifying* the cowpox, or why they co-operate in some, and not in all cases of vaccine infection, I shall not even venture

ture a conjecture; the causes will probably continue as inexplicable as those constitutional peculiarities which produce all the varieties of smallpox*.” That in situations where the smallpox is epidemic, and where children are exposed to variolous contagion about the time of their being inoculated for cowpox, variolous looking eruptions will appear, is certainly true; but that these are the effect of the vaccine inoculation, or are to be regarded as a symptom of *modified* cowpox, I apprehend is an opinion totally erroneous; because, had this been the case, the disease would certainly have been propagated under this modified form, whether virus had been taken from the pustules on the body, or from the vesicle produced on the arm by the insertion of the virus of cowpox. But the contrary takes place; and the Doctor expressly mentions, that the matter from the pustules did almost always produce a pustular disease, as indeed was naturally to be expected, seeing these were true variolous pustules;

* Vide Medical and Physical Journal for September 1800, p. 258.

tules ; while that taken from the inoculated vesicle on the arm, even of such as had numerous pustules on the body, produced the most genuine cowpox affection. Thus, we are told that pustular matter produced a pustular disease in fifty-seven cases out of sixty that were inoculated with it ; while matter taken from the arm of Ann Bumpus, who was inoculated with virus of cowpox, and who had also an eruption of three hundred and ten pustules on her body, produced an affection, in one hundred and sixty persons who were inoculated from that source, which Dr Jenner himself pronounced to be the true uncontaminated cowpox. Similar instances have come under my own observation, where though virus was taken from the inoculated cowpox affection during a very febrile state, which turned out to be the eruptive fever of smallpox, yet this virus produced, in all those inoculated with it, the true cowpox. These cases of eruptions, therefore, I can by no means agree with Doctor Woodville in calling cases of modified cowpox. There were certainly two distinct and separate diseases present, each

each of which was capable of producing its like by inoculation—The smallpox as a constitutional disease, and the cowpox as a mere local affection.

From these observations, I must conclude, that all those cases where a numerous eruption of pustules appeared after inoculation for cowpox, as detailed by Dr Woodville, and as mentioned by many others, are not to be regarded as cases of cowpox *either simple or modified*, but as cases of genuine smallpox, while the cowpox affection was merely confined to the part inoculated. Hence it follows, that the case recorded by Dr Woodville as a case of cowpox which terminated fatally, is in reality to be regarded as a case of pure smallpox, that infant having been inoculated with pustular matter, and having died in fits of the convulsive kind during an eruption of pustules, eighty of which had appeared; and that neither this death nor the eruption resembling variolous pustules can with the smallest degree of propriety be laid to the charge of cowpox.

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There are other eruptions which have also been observed to occur during the progress of cowpox, such as chickenpox, measles, &c. The former of these, I have observed at different periods of the cowpox affection, and still this has held a regular course, at least in so far as the local affection could indicate. But a question of much importance occurs here, which I have not yet had sufficient opportunity of resolving, namely, whether by the super-
 pervention of the chickenpox or the measles, during the course of cowpox, the constitutional affection of the latter will be merely suspended for a while, or whether it may not be entirely prevented, and so leave the person still liable to the action of smallpox. In two instances mentioned by Dr Jenner, where the symptoms of scarlatina anginosa supervened on the evening of the eighth day from inoculation for cowpox, effects of a very singular nature were observed. In the one case, the symptoms regarded as the criterion of the constitutional affection in cowpox, viz. the inflamed and hard areola, were suspended until the scarlatina had retired from
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the constitution. In the other case, the activity of the cowpox affection was such as not only to suspend the symptoms of scarlatina; but even to remove these, after they had shown their presence, by the scarlet eruption, for nearly twelve hours; and preserve its own action uncontrouled for the space of four days: after which, the symptoms of scarlatina recurred, and proceeded in a regular course*.

* Vide a continuation of facts and observations relative to the Variolæ Vaccinæ, by Dr Jenner, page 30.

C H A P. II.

OF THE ADVANTAGES WHICH WILL RESULT TO
SOCIETY FROM THE GENERAL PRACTICE OF
INOCULATION FOR THE COWPOX.

S E C T. I.

*The Cowpox Affection is greatly milder than the
Smallpox.*

THE advantages which will result to society
from the general practice of cowpox inocula-
tion, as a substitute for smallpox, are great beyond
calculation ;

calculation; and the comforts which will be experienced by individuals are such as to render this an object worthy of our most serious attention.

From the works of the ingenious Jenner, we may collect the following position concerning the nature of cowpox, which will serve to illustrate some of the advantages arising from the new inoculation.

The cowpox is greatly milder than the smallpox, even under the most approved mode of treatment; being never attended with danger, seldom even with sickness, and never producing pustules generally over the body, nor indeed any, but on those parts to which the virus of inoculation has been directly applied.

The smallpox, propagated by contagion, is allowed to be one of the most loathsome and fatal diseases to which mankind are liable; and although great improvements have been made in the medical
treatment

treatment of that malady, yet the bills of mortality, especially those of large cities, still show that the numbers annually cut off by that disease are so great as to be truly distressing.

In London, there is one death from smallpox in every six and one-half of all births; and in Liverpool, the proportion is rather greater. In Glasgow, it appears that one in seven die from smallpox; and were the bills of mortality regularly kept in this city, it is thought there would be little reason to suppose that its inhabitants were more favoured than those of other cities in this respect.

The mode of giving the smallpox by inoculation, which has been more or less prevalent in this country for nearly eighty years, was deservedly reckoned one of the greatest discoveries in the healing art, as by this operation, if universally practised, the mortality from that disease might be greatly diminished. Thus, according to the reports of Dr
Wood.

Woodville, it appears, that the average of deaths from inoculated smallpox is scarcely more than one in five or six hundred; and if one in six die from smallpox propagated by contagion, it follows, that ninety-nine out of six hundred might be saved by inoculation. It may be doubted, however, whether the practice of inoculation for smallpox, to the extent it is now performed, has lessened the mortality from that disease; for although this operation certainly renders smallpox more mild in those upon whom it is performed, yet there cannot be a doubt, that, by inoculation, smallpox propagated by contagion has become greatly more prevalent. This is so much the case, that while formerly many attained to old age without being affected by smallpox, it is now, from inoculation being almost constantly performed in some part of every great city, rendered nearly impossible for any person to escape that disease, even during the years of infancy and childhood: And, as by far the greatest proportion of mankind, at least in
this

this country, do still persist in rejecting the advantages held out by inoculation, refusing to give or to receive a disease, which, even under circumstances apparently the most favourable, cannot be declared void of danger, and which may prove fatal, it will, it is apprehended, upon strict enquiry, be found true, that inoculation, although it certainly saves the lives of many who have smallpox, does nevertheless increase the number of those to whom that disease proves fatal.

Having thus stated the great mortality from the severity of the smallpox, even under the most approved mode of treatment, we have next to observe, concerning the mild nature of cowpox, that although, upon a very moderate calculation, upwards of 100,000 persons have already been inoculated in these realms, yet there is not on record one instance of the affection having proved fatal. The knowledge of this fact alone, when contrasted with the account of the yearly mortality occasioned
by

by smallpox, which in Great Britain and Ireland is computed at 45,000 persons, might afford sufficient proof of the truth of our position; but it is not to this vast saving of human lives alone that the advantages resulting from the new inoculation are confined. Blindness, lameness, and scars upon the face, well known as the frequent consequences of smallpox, will, by the general introduction of cowpox, be no longer dreaded; and fits, so alarming and frequently fatal at the period of the eruption of the smallpox, although of the most benign kind, have not been observed, at least not so frequently, at any period of cowpox. From the great mildness of cowpox also, it may be communicated to the human constitution at all periods of life. During pregnancy even, a state when smallpox is particularly severe, this ailment may be communicated with safety. From the little derangement which takes place in the constitution during the operation of cowpox, no disease is called forth to which there may have been a predisposition, nor has this affection

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tion been observed to excite, or to leave in the system, a disposition towards any new disease; but, on the contrary, there are many instances mentioned, where children, who were formerly weakly and subject to eruptive disorders, have, after being affected with the cowpox, become greatly better in every respect.

S E C T. II.

*The Cowpox gives security to the Human Constitution
against the Smallpox.*

THE following position may also be collected
from the works of Dr Jenner.

Persons who have undergone both the local and
constitutional affection of cowpox are thereby
rendered unsusceptible of smallpox.

This singular fact, we have already observed, has
been known for time immemorial among those
people

people occupied in the business of dairies; and it is now fully confirmed by the concurring testimony of thousands of medical men, who have made it their business to investigate the subject with that diligent attention which its importance demands.

It is not meant by this position to assert, as has too generally been imagined, that every person who has been inoculated for the cowpox is immediately rendered secure against the contagion of smallpox. There are many circumstances, besides the mere inoculation, absolutely necessary to be ascertained before this security can be guaranteed. These circumstances, however, I decline mentioning at present, as I trust they will appear to be fully treated of in a future part of this essay.

Again, it is well known, that a person having undergone the smallpox is not absolutely secure against a future attack from that malady, as well authenticated instances are recorded where the same
 person

person has undergone this disease a second time, and these attacks were neither of them local, but very certainly general constitutional affections *. Now, with regard to the cowpox, it may also happen, that a person who has undergone that affection may yet be afterwards affected with smallpox ; but, as is well known in the former case relative to smallpox, so also in the latter relative to cowpox, the instances of the second attack from smallpox, or of the failure of the antivariolous power of cowpox, are so very rare, as by no means to affect the general established rule : That persons who have once undergone the smallpox, or the cowpox as a constitutional affection, may thenceforth be reckoned secure

* See particularly the case of Mr R. Langford, recorded in the fourth volume of the Memoirs of the Medical Society of London. That gentleman was infected with the smallpox at a very early period of life, and was much marked from the severity of the disease. Many years afterwards, he was again infected with the smallpox, which was of the confluent kind, and proved fatal on the twenty first day from the attack.

secure against all future attacks made by variolous contagion.

The two following cases are so similar as to merit attention. The first is given by Dr Jenner, in order to show, that, in some instances, the human constitution, after having undergone the smallpox, is still liable to be disordered by inoculation with the virus of that disease; and the second has been related to me by one on whose accuracy I can entirely depend, and shows that, in some instances, a similar disorder from inoculation with the virus of smallpox may also be communicated to the human constitution, after it has undergone the action of cowpox.

“ In my former treatises on this subject,” says Dr Jenner, “ I have remarked, that the human constitution frequently retains its susceptibility of the smallpox contagion, both from effluvia and contact, after previously feeling its influence. In farther corroboration of this declaration, many facts have
been

been communicated to me by various correspondents. I shall select one of them."

"DEAR SIR,

"SOCIETY at large must feel much indebted to you for your inquiries and observations on the nature and effects of the *variola vaccinae*, &c. &c. As I conceive what I am now about to communicate to be of some importance, I imagine it cannot be uninteresting to you, especially as it will serve to corroborate your assertion of the susceptibility of the human system of the variolous contagion, although it has been previously made sensible of its action.

"In November 1793, I was desired to inoculate a person with the smallpox. I took the variolous matter from a child under the disease in the natural way, who had a large burthen of distinct pustules. The mother of the child being desirous of seeing my method of communicating the disease by inoculation,—after having opened a pustule, I introduced

duced the point of my lancet in the usual way, on the back part of my own hand, and thought no more of it until I felt a sensation in the part, which reminded me of the transaction. This happened upon the third day; on the fourth, there were all the appearances common to inoculation, at which I was not at all surpris'd, nor did I feel myself uneasy upon perceiving the inflammation continue to increase to the sixth and seventh day, accompanied with a very small quantity of fluid, repeated experiments having taught me, it might happen so with persons who had undergone the disease, and yet would escape any constitutional affection; but I was not so fortunate; for, on the eighth day, I was seized with all the symptoms of the eruptive fever, but in a much more violent degree than when I was before inoculated, which was about eighteen years previous to this, when I had a considerable number of pustules. I must confess I was now greatly alarmed, although I had been much engaged in the smallpox, having, at different times, inoculated not less than two thousand persons. I

was

was convinced my present indisposition proceeded from the insertion of the variolous matter, and therefore anxiously looked for an eruption. On the tenth day, I felt a very unpleasant sensation of stiffness and heat on each side of my face, near my ear, and the fever began to decline. The affection in my face soon terminated in three or four pustules, attended with inflammation, but which did not mature, and I was presently well.

“ I remain, Dear Sir, &c.

THOMAS MILES.”

The second case is as follows;

“ S I R,

“ I TAKE the liberty to mention a circumstance to you respecting the cowpox, which happened last summer. I inoculated a child, five years old, in May, with the vaccine matter. The matter was procured from an eminent surgeon in this city. At the usual period, the inflammation on the

the arm was evident, and the disease, in every respect, ran the common course, the child being even a little sick on the sixth or seventh day. On the tenth day, matter was taken from the pustule of a pellucid appearance, and her sister was inoculated with it, who also had the disease in the most satisfactory manner, as likewise a third sister some weeks after, but with new virus."

"Early in November, I inoculated all the three with smallpox matter, taken from a child whose sister had just died from the confluent smallpox; both these children received the contagion from an inoculated child; no other case of that disease being in the neighbourhood, of course there could be no doubt of the matter I employed being genuine. The three children then were inoculated on the Wednesday; and two days after the inflammation in all of them was quite distinct, but gradually went off again in the two youngest. In the oldest, however, she who was first inoculated

for the cowpox, the inflammation increased; and on the Monday the child was unwell, had headach, vomiting, and a degree of fever until the Saturday, but which was smartest on the Wednesday and Thursday. On the Friday, a few spots somewhat resembling smallpox, but indeed of an anomalous appearance, were observed upon the child, but these, without cold or evacuations being but in practice, gradually disappeared on the two or three succeeding days, without coming to any suppuration. The arm, however, continued sore during this, and for some time after, but without any proper pustule, and a scab forming on it fell off in a week or so.

“ This case is certainly unworthy of notice, in so far as it regards the general success of vaccine inoculation, but, as a remarkable idiosyncrasy, I have presumed to intrude it upon you.

“ I am, Sir, &c.

“ *WM. SCOT.*”

Two

Two cases which I lately had an opportunity of examining, along with Dr Farquharson, afford very satisfactory proof of the complete efficacy of cowpox in shielding the human constitution from the action of the virus of smallpox.

Two children had been inoculated some months ago for the cowpox, and the ailment proceeded regularly through all the different stages. Lately they were also inoculated with the virus of smallpox.

In one of these children, the affection produced by the variolous inoculation advanced regularly until the sixth day, at which time a well formed pustule, with considerable surrounding inflammation, was present; after this, however, it quickly dried up, and there was no perceptible disorder excited in the constitution. In the other case, which was inoculated with the same stock of variolous matter, the affection advanced until the eighth day, at which time a well formed pustule, evidently containing

taining a fluid, and beset with numerous smaller pustules, and considerable inflammation, was also present: The whole of this affection, like the other, and contrary to the expectation of several medical gentlemen who examined it, quickly dried up during the ninth and tenth days, nor was the smallest general indisposition perceived.

Many have been the reports circulated in this city tending to shake our belief in the anti-variolous power of cowpox. Dr Farquharson and myself, however, have made it our study to investigate these in the fullest manner; and it affords me much pleasure to state, that every one of them, in so far as we have hitherto been able to trace, has proved to be erroneous; and, on the other hand, that this investigation has afforded numerous and satisfactory proofs of the compleat efficacy of the cowpox affection as a preventive of smallpox.

Again, it has been imagined by some, that although the human constitution is apparently shielded

shielded from the action of smallpox by having undergone the cowpox, yet that this security may not be permanent, but that, at the end of a certain period of time, the person will again become susceptible of smallpox. How long this period of security may continue, the favourers of this opinion have not mentioned; but, from the observations of the accurate Jenner and others, there is certainly every reason to expect that it will continue through life.

Dr Jenner's first experiments on this subject, as was before noticed, were made with a view of ascertaining the truth of the observation, that a person having undergone the cowpox rendered him secure against all future attacks from smallpox: And, for this purpose, he inoculated, with the virus of smallpox, persons who had been affected with the cowpox twenty-five, twenty-seven, thirty-one, and fifty-three years before, but who had never been infected with the smallpox, and these, he found, compleatly resisted that disease.

Mr

Mr Fermor, in Oxfordshire, has also related many cases which prove the permanency of the security afforded by the cowpox against the attacks of smallpox. “ In one instance, a person who had undergone the cowpox five or six and twenty years ago, was three times inoculated with the smallpox, four years after, without effect. Two of his brothers, who had never had the cowpox, received the variolous infection. He slept with them in order to catch the distemper if possible, but in vain. He has since that time frequently been exposed to its contagion; and has very lately inoculated his children with the smallpox without being infected.”

Another case related by Mr Fermor, is that of a person who, ten years after he had the cowpox, was three times inoculated for the smallpox, but without effect: After an interval of ten years more, he inoculated two of his children at his own house; and again, after a lapse of several years, he inoculated another child; but though fully and frequently

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ly exposed to the contagion, he was not in any degree affected by it *.

Many similar cases might be adduced to show the permanency of the security afforded against the attacks of smallpox, by the constitution having undergone the action of cowpox; but it is apprehended that those now mentioned afford evidence which may be deemed completely satisfactory on that point.

* See Reflections on the Cowpox, by William Fermor, Esq.

S E C T.

S E C T. III.

The Cowpox is not Contagious.

ANOTHER position concerning the nature of cowpox, the knowledge of which is of much importance to society in determining the propriety of adopting the general practice of the new inoculation, is the following :

The cowpox cannot, like the smallpox, be communicated from one person to another by contagion, that is by the exhalations arising from any one affected with that ailment.

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This position is also well attested by the experiments and observations of many medical men; and although Dr Woodville has reported, “That this is certainly true, when the disease is confined to the inoculated part, but when it produces numerous pustules upon the body, the exhalations they send forth are capable of affecting others in the same manner as the smallpox*.” Yet this does not invalidate the proposition, since, for reasons before given, it is clear that the disease under which the patients laboured, from whose cases he deduced his opinion, was not cowpox but genuine smallpox.

Persons who have neither had the cowpox nor the smallpox have been made to sleep, and be constantly with those inoculated for the former, throughout all its stages; nay, have been made to breathe over the local affection of cowpox at the most virulent period of its course, yet the ailment has never been produced in this way, nor by any other

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* Reports of a series of inoculations, &c. page 153.

than by actual contact with the virus—that is, by inoculation.

Such then are the great advantages and comforts which the general practice of cowpox inoculation promises to society and to individuals; and who is there at all acquainted with the history of smallpox, and with the ravages committed by that direful malady, that will not join with me in giving to Dr Jenner that unqualified praise he so richly deserves. To him alone is society indebted for the discovery, and for all the beneficial consequences which may follow the practice of this new species of inoculation. His sagacity first duly appreciated the observation of a certain affection being communicated from the cow to the hands of her milker, which proved a security against the smallpox; his ingenuity devised a method by which this blessing might be propagated among mankind; and his perseverance in expiscating and collecting facts, his judgment in appreciating them, and, lastly, his candour in promulgating the whole with that benevolence

nevolence so characteristic of a true welwisher of society, has woven for himself an everlasting crown of honour.

Dr Jenner has thus acted his part; it remains for the other members of society to act theirs; he has shown how important advantages may be obtained; it is theirs to carry this plan into execution by co-operating, both by example and by precept, to render general the practice of inoculation for cowpox: the reward being no less than the exterminating one of the most loathsome and fatal diseases to which mankind are liable—The smallpox. I must here, however, observe, that it is not the prevention of smallpox in a country for a few years, or perhaps a century, that ought to be regarded sufficient; that insidious disease is now known nearly throughout the whole inhabited globe, there being few countries where the inhabitants do not smart under its baneful influence. Although, therefore, the inoculation for cowpox be
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so general that a case of smallpox should not be known for half a century or more, over a vast extent of nations, yet if it should then unfortunately so happen, that the advantages resulting from cowpox are forgotten, or undervalued, and they can only be duly appreciated by those who are acquainted with the ravages committed by smallpox, and that the general practice of cowpox inoculation were to be neglected, then the smallpox may again be imported from some remote corner where the influence of cowpox was unknown, or it may originate *de novo*, (for who knows whence this pestilence proceeds?) and hold a course among mankind nearly as terrific as that described by authors who relate the ravages of this dreadful disease.

In order to prevent this foreboded evil, which would, with posterity, soon counter balance all the advantages which we are about to derive from the benign influence of cowpox, it were to be wished the inoculation of this ailment was taken under the
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consideration and direction of the legislative powers in every nation.—Measures might be contrived not only for rendering vaccine inoculation general, but also for continuing it with unremitting diligence throughout future ages. Public institutions for inoculation might be erected, and proper officers appointed, to whom returns of all christenings should be made; and it should be the duty of these officers carefully to observe that every child, before a certain age, be infected with the cowpox. The advantages which would result to every well regulated state, from such establishments, are too evident to require illustration; and the pleasing thought of co-operating to diminish the lot of human sufferings, would render the strict observance of such measures as might be deemed necessary, the particular duty of every wellwisher of the human race.

C H A P. III.

OF CIRCUMSTANCES TO BE CAREFULLY ATTENDED TO BY THOSE CONDUCTING THE INOCULATION OF COWPOX, THAT SOCIETY MAY REAP ALL THE ADVANTAGES WHICH CAN RESULT FROM THAT OPERATION.

S E C T. I.

Of the Distinguishing Marks of Cowpox.

IT has long been an observation in the medical world, that the most active and effectual remedies have often fallen into discredit from the ignorance

ance or inattention under which the administration of them has been conducted. In no instance is this observation more likely to prove just than in the inoculation for cowpox. Already have we seen that this mild ailment has been accused, from inadvertence, of producing great and serious evils, as eruptions, severe sickness, and even death, of which it now appears to have been perfectly innocent; and other instances have been told me where, from ignorance, inoculation was performed with matter very different from that of cowpox, a different affection was produced, and the persons left not only in a state of disease, falsely attributed to the matter of cowpox, but also still susceptible of smallpox, with which they were really afterwards infected.

In order that society may reap all the advantages which can result from the general inoculation of cowpox, it appears absolutely necessary, that those who undertake to conduct that operation be particularly

cularly attentive to obtain such a knowledge of those peculiarities in the appearance of cowpox, as may serve to distinguish it from every other affection.

It has frequently happened, that persons have been affected with eruptions on the hands and arms, followed by severe general indisposition, from milking diseased cows; and yet have afterwards, on exposure to variolous contagion, been severely affected with smallpox. This shows that there are eruptive diseases affecting cows different from cowpox, which may be communicated to man, however, without rendering his constitution unsusceptible of smallpox.

The disagreeable consequences which have resulted from an opinion of the unsusceptibility of smallpox, after having been affected in the manner now described, are numerous, even before the introduction of inoculation for cowpox; and now these,

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without great precaution, may be increased; virus for inoculation may be taken from persons thus affected from milking cows, and propagated among mankind for that of cowpox.

Again, it has also frequently happened, from an insufficient knowledge of the appearance of the cowpox affection on the human species, that virus for inoculation has been taken from pustules or vesicles on the human body very different from those of cowpox. With this, inoculation has been performed; and the consequences have not only been highly prejudicial to the persons infected, but have also served to bring the new inoculation into very unmerited discredit.

From a consideration of these circumstances, it will readily appear, that it is of the first importance to society, in the propagation of cowpox, to ascertain sure marks whereby this ailment may be readily distinguished from all others, both as affecting cows and as affecting the human species.

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The pustular eruptions which appear upon the udders and teats of cows, chiefly in the spring season, and which are often communicated to the hands of their milkers, without giving security against the attacks of smallpox, are many and various. Dr Jenner has paid particular attention to this part of his favourite subject, and he draws the following distinction between them and cowpox.

The cowpox is a more severe disease than any of the other pustular diseases with which cows are affected,—and the vesicles of it have a livid or bluish appearance, which is not observable in the others. The cowpox is also attended, at a particular period of its course, with a surrounding erysipelatous inflammation, and very considerable hardness; and the affection is apt to degenerate into foul and troublesome ulcers. During the course of the disease, the cow is observed to refuse food, and the secretion of milk is considerably diminished, none of which symptoms take place in the other pustular affections.

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It is also added, on the authority of those who are conversant in the treatment of cattle under these eruptive diseases, that the cowpox is to be distinguished from all the other pustulous sores, by the latter never eating into the fleshy parts like the vesicles of the former, but affecting the skin only, quickly ending in scabs, and particularly by their not being nearly so infectious.

Dr Jenner relates the case of a girl who was affected with an eruption in consequence of milking cows, which, at the same time that it was so similar in its course as to be mistaken for cowpox by the people of the dairy, yet is sufficiently marked, by the presence of many of those distinguishing symptoms above mentioned, for us to declare that it was a very different affection.

“ Sarah Merlin lived at a dairy consisting of eighteen cows. The nipples and udders of three of the cows were extensively affected with large white blisters.

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These cows, the girl milked daily; and, at the same time, assisted with two others in milking the rest of the herd.

“ It soon appeared that the disease was communicated to the girl. The rest of the cows escaped the infection, although they were milked by her several days after the three above specified had these eruptions, and even after her hands became sore.

“ The two others, who were engaged in milking the cows indiscriminately, received no injury. On the fingers of each of the hands of the girl appeared several large white blisters, she supposes about three or four on each finger. The hands and arms inflamed and swelled, but no constitutional indisposition followed. The sores were anointed with some domestic ointment, and got well without ulcerating.

“ As this malady was called the cowpox, and
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regarded as such in the mind of the patient, she became regardless of the smallpox; but, on being exposed to it some years afterwards, she was infected, and had a full burthen *.”

In this history we find wherewithal to distinguish the affection from cowpox, according to the marks just laid down—The vesicles were white, and wanted the bluish appearance of cowpox. The affection, though communicated to the girl by numerous inoculations, was mild, did not affect the constitution, at least to any perceptible degree, nor did it ulcerate. And although the same persons milked the whole eighteen cows indiscriminately, yet neither were any of the other persons or cows infected, a circumstance proving this disease to have been much less infectious than cowpox.

It must not, however, be concealed, that although the distinction between cowpox and the above case of eruptions, which was so similar as to be

* Jenner's Inquiry, &c. 2d edit. p. 75.

be mistaken for cowpox, is pretty clearly pointed out, yet this cannot be expected in every case; for even Dr Jenner himself allows that it is extremely difficult, in many cases, to distinguish between the true, and what he calls the spurious cowpox, as affecting cows.

Seeing then, that this difficulty still exists, and that cowpox, as affecting the cow, has been, and still may be, liable to be confounded with other pustular eruptions, to the great detriment of the new inoculation and all concerned, I would have it observed as a positive rule, that in all cases where recourse is had to the cow to obtain virus for inoculation, the affection, or virus reproduced on the person inoculated, never should be farther propagated among mankind without being first subjected to the true and only test. Thus, when virus is taken from the vesicle on the cow, and inserted into the human subject, if an affection is produced having all the appearances of cowpox as described above,

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the earliest opportunity should be taken to expose such persons to the contagion of smallpox, either by inoculation or otherwise, in order that the anti-variola powers of the affection gone through, may be well ascertained before the virus, thus generated, be widely propagated as that of cowpox. The virus, thus proved and found effectual, is to be carefully preserved, and alone employed; and it should be a maxim, and one never to be deviated from among medical men, and all others who engage in cowpox inoculation, never to use virus for this purpose unless they can ascertain that the stock from whence it was produced had been proved in the manner above specified.

With regard to the symptoms which may serve to distinguish the cowpox as affecting the human subject, I would observe, that by a strict attention to the progress of the phenomena, and to the different appearances mentioned in the description of this ailment, we may, in my opinion, readily distinguish it from all
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others; more especially if we keep in remembrance, that pustular eruptions appearing on other parts of the body than where the virus may have been applied, and advancing to maturation, do not belong to cowpox. This teaches a very useful lesson in the practice of cowpox inoculation, viz. never to take virus for the propagation of this ailment from any pustule or vesicle which may appear upon any other part of the body during the cowpox affection than that where the inoculation had been performed. Inattention to this rule has already been attended with the most disagreeable consequences.

Many have thought that the cowpox and the smallpox were originally the same disease, and that the greater feverity of the latter was owing to certain accidental circumstances, as the combination with other diseases, &c. still working new changes upon the original mild ailment, until it had acquired all the malignant qualities under which we now see it

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making its devastations amongst us : and, as the natural consequence of such an opinion, that the cowpox might be expected gradually to lose its present mild character, and, by passing through a variety of constitutions, become again as severe a disease as smallpox.

While those cases in which eruptions succeeded to the vaccine inoculation, as recorded by Doctor Woodville and others, were regarded as cases of cowpox, there seemed some foundation for these opinions : now, however, there are many circumstances ascertained concerning the nature of cowpox, which render it highly probable that this, and those cases where eruptions were observed, are quite separate and distinct affections, agreeing in nothing but that of rendering the same constitution unsusceptible of the action of each other ; and that the above opinion was formed rather with a view of explaining what was not understood than from any correct reasoning on the subject.

In the first place, the appearance of the topical affection, induced by the inoculation of each, is perfectly different: In the cowpox, the vesicle is circular, with a regular and well defined margin, the edges are elevated and turgid, while the center is depressed, and, so early as the fifth or sixth day, occupied by a hard crust, which gradually increases until the whole vesicle is dried up, about the twelfth or thirteenth day from inoculation.

The affection produced by the inoculation of smallpox, on the other hand, is not circular, but consists of many distinct pustules, which, after some time, unite and give a very irregular appearance to the whole—nor is any crust formed upon the pustules thus produced until they have matured, or arrived at their height as it is called. The varicellous pustule also, when at its height, contains well formed pus; and afterwards dries into a thin, rough, opaque scab, while the fluid of the cowpox vesicle

is always limpid, and ultimately concretes into a smooth and semi-transparent crust. The whole of the fluid too found in the smallpox pustule is contained in one cavity, and is readily evacuated by one small puncture:—But the structure of the cowpox vesicle is cellular, somewhat resembling a honey-comb, and the cells seem to have no communication.

In smallpox, also, an eruption of pustules, more or less numerous, takes place over the surface of the body: In cowpox, no eruption appears, unless on the spot where the virus of inoculation is applied.

Another great and important difference between the cowpox and the smallpox is, that the former cannot be communicated by contagion, or the effluvia arising from the body of a person under the influence of its specific operation; whereas, the highly contagious nature of smallpox, the great prevalence

valence of that disease being entirely owing to that quality, is notorious.

Again, the virus of cowpox, after passing repeatedly through the human constitution, still retains the power of exciting a disease in the cow every way similar to that by which it was originally produced in man; but the virus of smallpox inserted into the cow, although it has been done by many expert inoculators, has hitherto failed of producing any disease,

These very material differences between cowpox and smallpox give us good ground to hope, that the mild character of the former will never degenerate into the malignant nature of the latter: And this, we have farther reason to expect, when we consider, that although the virus of cowpox has already passed through a great variety of human constitutions, yet there is not observed in its mode of action the smallest approximation to that of smallpox.

pox. In my own hands, the virus of cowpox has already been regenerated about sixty times on different persons, and among these there have been great variety of constitutions, but still neither Dr Farquharson nor myself are sensible of the smallest difference in its mode of action.

S E C T.

P E C T. II.

Of the State of the Person to be Inoculated.

THE next circumstance to be carefully attended to in conducting the inoculation of cowpox, is the state of the person on whom the operation is to be performed.

It appears, from the cases detailed by various writers on this subject, that infants a few days old, may almost immediately after birth, have been inoculated, and have gone through the cowpox affection with

with as great regularity, and with as much ease, as those more advanced in life. That this has been the case there can be no doubt, and it certainly marks the great mildness of the constitutional ailment, but, with regard to the propriety of the measure, I confess I am not altogether satisfied; and, from a consideration of the very great degree of irritability of infants at this period of life, whereby febrile symptoms, if once excited, must be expected to be of very doubtful issue, and whereby the introduction of any foreign and active agent, such as the virus of cowpox, into their constitution, might be expected to produce such a degree of derangement as to induce convulsive fits, which are always, at such a period of life, attended with imminent danger, I find myself much inclined to prohibit the inoculation for cowpox until about the end of the third month. Should smallpox, however, be in the neighbourhood, and there be, in consequence, the smallest chance of the contagion spreading to the infant, then, no age, however young,

young, should prevent immediate inoculation for cowpox. The presence of this dreadful malady appears to me, however, the only cause which can render the inoculation for cowpox eligible before the end of the third month.

During the period of teething also, children are in general so irritable, that unless there exists some urgent cause, as the presence of smallpox in the neighbourhood, the inoculation for cowpox had better be delayed, for the same reasons as mentioned above. Besides, at such times, children are liable to frequent febrile attacks, and to eruptions over their body, proceeding from irritation. From these causes, the specific action of cowpox may either be suspended beyond the regular period, creating doubt and anxiety, or it may perhaps be altogether superseded.

Again, even although the cowpox affection may advance regularly for some days, yet the general

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restlessness which prevails during the irritable state of teething, is such as frequently to occasion the vesicle to be rubbed and broken, and so its contents may be compleatly effused, and the part degenerate into an ulcerous state, at too early a period to ensure the constitutional affection.—Or the virus may be carried, by the fingers or otherwise, to different parts of the body, and there, from the state of the skin, perhaps covered with eruptions, readily excite new vesicles; thus reproducing many local affections, each of which will be nearly as severe as the original one produced by inoculation. From this circumstance, I lately saw the affection communicated from the arm of a child to the eyelid, which became so much swelled as to occasion some trouble, and shut up that eye for three days. And here I have to observe, that the only other case, among upwards of 700, which have fallen under my immediate inspection, in which I have ever seen eruptions upon any other part of the body than that where the virus was intentionally applied,

plied, and which could with any degree of propriety be attributed to the effect of the cowpox inoculation, was under circumstances precisely similar to what I have now mentioned. A child was inoculated at the Public Dispensary: The affection advanced regularly; and, on the seventh day, matter was taken from the vesicle for inoculation. On the ninth day, the mother observed a vesicle on the fore-arm of the same side, and one near the part inoculated. About the same time, another was observed over the scapula or shoulder-blade of the same side, and a fourth on the loins; on the eleventh day, when the child was brought again to the Dispensary, these four secondary vesicles appeared nearly as far advanced as the original one: And what proves them to have been cowpox vesicles is, that Dr Farquharson took virus from the one over the shoulder-blade, and with it produced the proper affection in another child who was therewith inoculated.

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Here, I suppose, the vesicles which appeared in the course of the affection were produced by a second and casual inoculation from the application of some of the virus which had flowed from the original vesicle. That much virus had been effused after taking matter from it on the seventh day, we had proof both from the report of the mother, and also from the appearance of the vesicle on the eleventh day; and the state of the skin seemed at that time to have been particularly favourable for being affected by it after the application.

The irritable state of the body during teething, I am, therefore, inclined to think unfavourable for the inoculation of cowpox; both on account of the great tendency to fits, which is thereby induced, and for the other reasons just mentioned; and I am clearly of opinion, that unless the presence of the smallpox in the neighbourhood should render this necessary, it will be more for the advantage of all concerned,

concerned, as well as for the credit of the cowpox, to defer the inoculation until the eruptions, and general affections of the system, which are the consequences of this irritable state, shall have disappeared.

It does not appear to me, that any of those chronic eruptions to which children are liable should prevent the inoculation of cowpox, more especially if care be taken to preserve the vesicle entire, so that no new inoculation may take place. Some diseases, such as tinea capitis, sore ears, and sore eyes, I have known to become much milder after the person had undergone the cowpox affection.

In all scrofulous cases, and even during pregnancy, the inoculation for cowpox may be performed with great safety.

The presence of smallpox in the neighbourhood, or persons being placed under circumstances whereby they

they become exposed to the contagion of that disease, is in every instance to be reckoned an inducement for, rather than an argument against, the immediate inoculation for cowpox. The vulgar generally start objections to this opinion, but to those who think one moment, the propriety of the position must be obvious. There is reason to suppose, that the contagion of smallpox, introduced into the human body in the state of effluvia, takes generally fourteen days to manifest its operation on the system, while the constitutional affection of cowpox seems to take place on the eighth or ninth day from inoculation, when the progress is regular. Now, as we have no mark whereby to guide us concerning the presence of smallpox contagion in the body, until the fever or eruption take place, and whereby we might judge of our remedy being inadequate to prevent the threatened danger, no idle conjecture, that the antidote might be applied too late, should ever prevent immediate inoculation; and
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this the more especially, as it is well known that some constitutions are much less liable to suffer from exposure to contagion than others, nay, that the same person is less susceptible of the action of this agent at one time than at another. And also, because it appears, from the observations made by others as well as myself, that when the smallpox does supervene during the course of cowpox, no increase of the severity of symptoms is at all to be apprehended; nay, it is thought, and I believe with truth, that when this coincidence does take place, especially if the cowpox affection had made some progress, as after the seventh or eighth day, the symptoms of smallpox are rendered milder, judging from a comparison of the case with others occurring where no cowpox inoculation had been made, or from the apparent severity of the first symptoms. Having, however, performed inoculation under such circumstances, we are afterwards carefully to discriminate whether the smallpox or the cow-

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pox prevails, and not to attribute the severe symptoms which generally take place in the former to the mild and gentle nature of the latter. When I inoculate for cowpox under similar circumstances, I always intimate, that security from smallpox cannot be promised for the space of fourteen days, that is, until the usual period for the appearance of that disease, after the contagion may have been applied, has passed away, and the cowpox affection has exerted its full powers upon the constitution.

It is proper here to observe, that inoculation for the cowpox has been carried on at the Edinburgh Public Dispensary, by Dr Farquharson and myself, during the severity of our winter, and also during the whole of last summer, when the thermometer was uncommonly high for this climate, without our being able to observe any aggravation of symptoms which could at all be attributed to the difference in the temperature of these seasons. Reports

ports also from the south of Europe, and from the more northern climates, testify the uniform mildness in the appearance of every symptom of cowpox: We are, therefore, warranted to conclude, that in this climate, at least, this new inoculation may be performed at all seasons of the year with equal advantage.

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S E C T.

S E C T. III.

Of the Virus to be used for Inoculation.

A PROPER attention to the state of the virus to be inserted, is a circumstance of much importance in conducting the inoculation for cowpox. If matter for inoculation be taken at an improper period of the ailment, or be not properly preserved after it is taken, it may be so far changed in its nature as to be utterly unfit to produce cowpox in the person to whom it is applied.

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With regard to the proper period of the cowpox affection for obtaining virus for inoculation, it is to be observed, that, during the seventh, eighth, and ninth days, it appears to be in the state of greatest activity. This observation, however, it must be remembered, is only applicable to those cases which run through a perfectly regular course; for as we frequently find that, from various causes, the progress of the vesicle is accelerated or retarded, so in these the proper period for obtaining the virus in the most active state will be different from that now mentioned. This point, therefore, must be determined, in a great measure, by a careful examination of the state of the vesicle at the time.

During the seventh, eighth, and ninth days from inoculation, when the affection has proceeded regularly, the vesicle appears of very considerable magnitude, elevated above the surrounding parts, and having a flat or rather concave surface, with a small crust in the centre. The margin is turgid
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and pale, giving a very singular appearance, as if a round body, like a worm, were coiled up immediately under the cuticle, and as yet the areola is incomplete. If a puncture be made into the vesicle, in the manner hereafter to be mentioned, while in this stage of its progress, a perfectly transparent fluid exudes. This is the proper virus, and in a state of the greatest activity. About the end of the ninth or beginning of the tenth day from inoculation, the areola is fully formed; and this is said to be a mark that the virus begins to be less active, and therefore improper to be used. It is also said, that virus taken after this period, frequently fails of producing the anti-variolous process in the constitution, even although the local affection appears to run a regular course.

I have inoculated, and produced the proper affection with virus taken from a vesicle the fourth day from inoculation; but the quantity of virus to be had at this period is so small, and the risk of disturbing

turbing the regular progress of the vesicle from which it is taken, is so great, that, in my opinion, it ought never to be done, especially as, by waiting until the vesicle is in the state described above, abundance of virus may, almost always, be obtained, and much freedom may then be used without fear of impeding the regular progress of the affection.

Again, I have inoculated with virus which was taken at the end of the eleventh day from inoculation, and after the areola had been completely formed, and with it have produced the affection regular in all its stages : But I have observed, that the virus, when taken at this stage of the affection, was less certain of taking effect, and that it frequently happened, that although the appearances were favourable for the first three or four days, yet that they would then gradually die away, and no vesicle be produced : At other times, virus of this description has produced a pustule of considerable size, and one having a considerable degree of redness

ness around the base, but which was, nevertheless, easily distinguished from cowpox. This pustule has an *elevated* centre, which gives it more or less the appearance of a common phlegmon; there is little or no hardness around its base, and the contained fluid quickly runs into suppuration, so as by the sixth day to contain well formed pus. After this, it quickly dries into an opaque crust, very different from that described as the common termination of the cowpox vesicle.

It must be confessed, however, that there is often considerable difficulty in distinguishing between an affection of this kind and that of the cowpox, as the former frequently exhibits almost every variety of appearance from that wished for to that of a common phlegmon. The most certain mode of judging on this point is, in my opinion, by a careful examination of the affection about the seventh day from inoculation, just before the proper period for the formation of the areola, and from observing the
progress

progress of the affection after this period. By attending to what has already been said, when describing the progress of cowpox, great precision may be attained in judging of the nature of the affection produced, but in every case, where there is any material deviation from the general appearance and progress of the ailment, it ought to be a maxim to reinoculate the person until the whole proceeds regularly, or until we are persuaded that the system cannot be affected by the virus of cowpox in the way we would wish, when recourse may be had to inoculation with the virus of small pox; some such obstinate cases I have met with in which repeated inoculations for cowpox have been constantly resisted; but I have not yet had an opportunity of satisfying myself whether all these persons would equally resist the operation of the virus of smallpox. One of these persons I had inoculated with matter of smallpox at the age of three months; the operation did not then produce the desired effect, and the parents would not admit of his being reinoculated. About three years afterwards,

wards, I inoculated him at least six different times with the virus of cowpox, without being able once to produce an affection of a regular appearance. Sometimes the inoculated part inflamed for three or four days, and then every symptom gradually went off, without any appearance of a vesicle being formed: At other times, the affection would advance until the seventh day; but then it had every appearance of a common phlegmon, and contained pus.

Another instance has lately occurred where the constitution equally resisted the action of the virus of cowpox and of smallpox. This child was repeatedly inoculated, at the Institution, with the virus of cowpox; and although this was done at the interval of some months, yet no regular vesicle was ever produced, the appearances being much similar to those mentioned as the effect of the cowpox inoculation in the case related above: Lately I inoculated her with smallpox virus. The puncture inflamed

inflamed for two days, and then a very considerable degree of hardness was felt on passing the finger over the part. This hardness continued for three days more, and then gradually disappeared. No pustule or vesication was produced.

It is to be observed, that in these cases, as well as in the others which I have found to resist the action of the virus of cowpox, the matter used for inoculation was taken at the period of the greatest activity, and produced the regular affection in other persons to whom it was applied.

In smallpox, immediately on opening the pustule, even by a small puncture, the whole of the contained fluid flows forth, and is easily obtained; It is not so in the cowpox, from the vesicle of which the best way of obtaining virus is the following:

At the proper period in the progress of the af-
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fection,

fection, as described above, make three or four punctures with the point of a lancet between the central crust and the margin of the vesicle, so as merely to penetrate through the cuticle; then wait for the space of a minute, during which a limpid fluid will be observed to exude from each of the punctures and to form a small drop. This is the proper virus for inoculation, and is to be carefully collected and preserved. By waiting a little longer, more virus will be obtained; and by going on in this manner, and gently pressing the vesicle occasionally with the side of the lancet, one pustule will be found to yield a very considerable quantity. But I have generally observed, that when an unusually great quantity of matter flows from one vesicle, it is proportionally less active than when the quantity discharged is small.

After a sufficient quantity of virus has been obtained, I always desire the surrounding parts to be lightly washed with cold water, in order to clear
away

away any matter which may have been left on them ; and a soft cloth dipped in the same to be applied to the vesicle to check the farther effusion of the virus.

If the discharge of fluid continues notwithstanding this application, a single drop of Goulard's extract, of the diluted vitriolic acid, or of some other astringent remedy, must be applied in order to restrain it, as there is a danger of the whole contents of the vesicle being discharged as fast as secreted, and thus the absorption and farther regular progress of the affection being compleatly prevented, or of the affection, from this circumstance, degenerating into a troublesome sore.

If the virus thus obtained is to be used for inoculation in the space of twelve hours, it may preserve sufficient activity although kept upon a common lancet, especially if the fluid is compleatly dried, by exposure to the air, before the lancet is put up. If, however, the virus is to be kept beyond

yond that space of time, before using it, I would recommend some other mode of preserving it, because it is wonderful how very soon a common lancet, loaded with cowpox virus, becomes rusty, and the virus of course decomposed; in which state, if the operation be performed, it will certainly prove unsuccessful, and bring disappointment to all concerned. This caution is the more necessary as although the inoculation, when performed with matter thus decomposed, will certainly fail of producing the desired effect; yet a considerable degree of inflammation will be occasioned by the rusty lancet, and acrid matter, which may cause a doubt for some days concerning the nature of the affection produced, or if the inoculated part inflames and advances to a state of suppuration, as frequently happens, it may be mistaken by those who are little accustomed to observe the regular progress of cowpox, for a properly formed vesicle.

Various are the modes which have been adopted
for

for preserving the virus of cowpox in an active state. In the essential points, however, all these modes are the same, viz. first in so preparing the fluid that it shall undergo the least possible change by fermentation, and then in securing it as much as possible from the action of the external air. The first of these points is effected by carefully drying the fluid by exposure to a gentle heat as soon as may be after it is taken from the vesicle. The second, by various contrivances, according to the substance upon which the virus is lodged.

The modes which I have found most convenient and successful for preserving the cowpox virus in a state of activity are the following :

The virus, when taken from the vesicle, is to be put upon a small piece of plain glass, and, by exposure to an atmosphere of a moderately warm temperature, allowed to become quite dry; another piece of glass of the same size is then to be put
over

over this, and the whole is then to be wrapped up firmly in a piece of tinfoil, of gold-beater's leaf, or of bladder damped with water, so as to exclude the air as compleatly as possible. This forms a neat thin package, which may be conveniently sent in a letter to any distance, and in this way the virus may be preserved for some months in a very active state.

Another mode, and that which I have generally followed, is to have a small phial made for the purpose, having a long stopper which reaches nearly to the bottom. This stopper is ground at the upper part, so as to fit the mouth of the phial as exactly as possible; and that part of it which is within the phial is formed into square surfaces which are numbered. Upon these squares the virus is lodged; and, when dry, is, with the stopper, put into the phial, where it is very completely secured from the action of the external air. In this way I have hitherto found the virus keep so well, that I think my success in inoculating, is more certain when done with

virus which has been preserved in this manner, even for a week, than when done with it as taken immediately from the vesicle.

Some have thought it advisable to fill the phial, in which the virus is to be put, with a particular kind of air, *hydrogen gas*, in order to prevent any fermentation, and consequent decomposition of that fluid; but if care be taken to allow the matter to become perfectly dry before the stopper is thrust into the phial, there will be very little risk of any such process taking place, at least for a very considerable time.

The virus may also be preserved upon a quill, or upon a piece of cotton thread, both of which are, when dry, to be carefully secluded from the air in any manner which may appear most convenient and effectual.

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There is yet another way which I have lately discovered by which the virus of cowpox may be obtained and preserved in an active state, and fit for inoculation, which, at the same time that it is more convenient, promises also, from the trials which I have made, to be fully as successful as any of those which have been mentioned. It is by preserving the crusts which are formed from the inoculated vesicles of cowpox, dissolving a portion of these in water, and using this solution for inoculation in the manner afterwards to be mentioned.

At first it appeared to me that this mode of giving the cowpox might be liable to the same objections as are made to performing inoculation with virus taken from the vesicle at an advanced period of the affection. An attentive observation, however, of all the circumstances which take place in the topical affection during the latter stages of cowpox, and of the conversion of the inoculated vesicles into the
 semitransparent

femitransparent crusts, has served to convince me that my fears on this point were groundless.

It has been observed by authors, that, the fluid contained in the vesicle, in the advanced stages of cowpox, has undergone a certain change, whereby it is rendered unfit for propagating the affection, so as to give security from the smallpox; and this change is said to be marked by the puriform appearance which the fluid then assumes. The proper explanation of this appears to me to be as follows.

Very soon after the cowpox vesicle has attained its greatest magnitude, which is about the tenth day, the limpid fluid is entirely converted into the semitransparent hard crust; but the parts underneath this being still very tender, as soon as the peculiar inflammation from cowpox is gone, inflammation is frequently renewed in a different way, viz. by the irritation of the crust; and this soon terminates in the production of well formed pus.

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This circumstance I have frequently observed, and was at first not a little surpris'd to find a new areola formed very soon after the proper one had disappeared. On examination, however, I found that the inflammation in these cases was merely superficial, and that, on pressing the crust, pure pus was evacuated from underneath. I have also frequently observed a complete ring of pus around the properly formed crust about the twelfth day, which appeared to have been produced in the manner above mentioned, while the crust itself retained its peculiar character unaltered. From the above explanation of the formation of purulent matter in the latter stages of the affection of cowpox, the cause of the frequent failure to produce that affection with matter taken at these periods is obvious; for although some inflammation may be produced thereby for a few days, yet this cannot be expected to give security from smallpox.

With regard to the formation of the crusts; at-
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tention to the progress of the affection will show that a small vesicle is formed about the fourth day, and that on the fifth or sixth day a crust is formed in the centre of this vesicle, which can be nothing else than the limpid fluid concremented. By degrees, the size of the vesicle increases, more cells are formed, and more fluid effused into them; and in proportion as this takes place at the margin of the vesicle, the size of the central crust is also increased. The central crust, therefore, is not formed from a fluid which has been in a stagnant state during the whole course of the affection, and which might be supposed on this account to have undergone some change, or to have been converted into the state of purulent matter unfit for propagating the affection; but, on the contrary, is formed from the most active virus secreted from the fourth day, until the time of the vesicle having attained its greatest size; for this virus is every hour hardening into these crusts, in which state it seems incapable of further change, at least for a very considerable time.

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These observations concerning the frequent termination of the topical affection of cowpox, and the conversion of the vesicles into crusts, while they account for the frequent failure in communicating the affection by inoculation with the fluid found after the affection is on the decline, and for the uniform appearance of this fluid at that time, also confirm an opinion, that the crust is the real extractive matter, if it may be so called, of the most pure and active virus, secreted into the cells of the vesicle. If this explanation be admitted, it will readily be granted that, by dissolving these crusts in water, thus restoring what they had lost by exsiccation, and using this solution for inoculation, we obtain a virus in a pure and active state, and well suited for the propagation of the affection whereby itself was produced. That this is so in fact, I am enabled to state from the success of a great number of trials which I have made with virus of this description; and I can safely declare, that by inoculation performed with such virus, I have produced the affection

tion with as great certainty, and regularity in every respect, as with virus newly taken and used in the common way.

The very first crust which I used in this way for inoculation had been kept for a whole month, no otherwise excluded from the action of the air than by being loosely wrapped in a small piece of paper ; yet four inoculations performed with it, on four different persons, took effect, and advanced as regularly as four other inoculations performed at the same time, and on the same persons, with recent virus.

I have since inoculated a great many persons with virus obtained from many different crusts, some of which had been kept for two months, and my success in producing the regular affection has been as great as by using virus which was obtained fluid from the vesicle.

I must here observe, that it was not the appearance

ance alone, of the affection produced by the virus obtained from the crusts, that was trusted as a sufficient mark of the antivariolous process in the constitution: Many of the persons thus inoculated were afterwards inoculated with the virus of smallpox, and were found completely unsusceptible of that disease.

Some caution, however, is necessary in choosing crusts for inoculation, in order to insure success equal to what I have experienced from the use of them. In the *first* place, it is absolutely necessary to ascertain that the topical affection, whereby they were produced, had been regular; and, *secondly*, that the crust to be used is really that formed from the vesicle; this is the more necessary to be attended to, as we frequently find that the proper crust, from being surrounded with purulent matter, or other causes, falls off at an unusually early period, and it then happens that another is quickly formed, but with qualities very different from those possessed by

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by that which preceded it: without attending to this circumstance, one of these might readily be mistaken for the other, and much disappointment be thus produced, more especially as the second crust will also be found transparent from being formed of a ferous fluid. It is those crusts only which can be ascertained to have been formed from the vesicle after it has run through a regular course, and which, when separated from the part, are found, on examining them between the eye and a strong light, to be nearly transparent, which I would recommend ever to be used for inoculation. The best mode of preserving these crusts appears to me to be by putting them into a small phial with a well ground glass stopper, as soon as they fall off, and thus secluding them as much as possible from the action of the air: The particular manner of using them is much the same with that of using virus which has been dried upon glass, &c. and will be afterwards mentioned.

Should

Should this mode of collecting and preserving the virus of cowpox be found equally successful for inoculation in the hands of others as it has proved in mine, another important fact will be added to the practice of cowpox inoculation : As it will afford, in the first place, an easy way of obtaining virus in those cases where attendance cannot be given to take it at the periods recommended as the most proper, and from which circumstance the inoculation for cowpox has in many instances been suspended, and the smallpox allowed again to commit its deprivations. It will, in the second place, afford an ample source of virus, as one crust will afford enough of it to inoculate many persons ; and, in the third place, it appears to me that the virus, in the form of crust, will be better fitted for keeping in an active state than in any other way which has been recommended ; and certainly it may, in this way, be very easily transported to any distance.

S E C T. IV.

Of the different Modes of inserting the Virus.

FOR performing the cowpox inoculation, the virus may be used either in a fluid state, as it is immediately taken from the vesicle, or after it has been preserved for some time in any of the ways above mentioned.

In the former case, it has been recommended, on taking the virus from the vesicle, immediately to insert it in as fluid a state as possible, by scratching
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the skin with the point of the lancet until this becomes tinged with blood ; and it is enjoined, that the lancet be held nearly in a perpendicular direction, in order that the virus may by its own gravity fall more directly into the wound.

This mode of performing the inoculation, I have, however, found very frequently to fail ; and, on considering the subject, I am inclined to attribute this failure to the following causes. When the matter is very fluid, as it always ought to be when issuing immediately from the vesicle, such a degree of repulsion takes place between this and the polished surface of the lancet, that the smallest touch, even that of gently scratching the skin, is sufficient to make it start from the point of the instrument, which is then left quite clean. Again, I have observed, that when the virus is applied in the manner above directed, or to the surface of the skin where the cuticle has been just abraded, that instant in which it touches the wound a great discharge of blood immediately

mediately takes place, much greater, indeed, than from the application of any other thing, under similar circumstances, with which I am acquainted. From this extraordinary effusion of blood, I apprehend that the virus is often either completely washed away, or what remains is included in the coagulum or crust which is formed upon the part, without ever touching the skin, so that no effect can in consequence be produced.

After trying this method as recommended by Dr Woodville, and finding it very often fail in producing the desired effect, I used an instrument formed like a blunt lancet, with a few fine teeth upon the shoulder: With these the cuticle was merely abraded, and the virus applied; but it was curious to observe, on the application of the virus, how instantaneously a most profuse hemorrhage, in proportion to the wound, always took place. However gently this instrument was used, I found my
operations

operations equally unsuccessful, and it is apprehended from the same causes, as before.

The above causes of the frequent failure in procuring the insertion of the cowpox matter having occurred to me, the following plan for conducting that operation was adopted, which, I am confident, has been attended with more success than any other of which I have made trial.

When the person to be inoculated is in the same room, or even in the neighbourhood of the one from whom the virus is taken, I use a common lancet.

I take the virus from the vesicle in the manner mentioned, and with the point of a pin, or of another lancet, take care that it is kept completely to the point of the instrument, until such time as it becomes glutinous, or of such a consistence as not easily to be wiped off. Thus armed, I introduce
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the lancet at the place determined on for inoculation, about the eighth part of an inch, merely under the cuticle, and retain it there for a few seconds; when the lancet is withdrawn, I wipe it, as it were, by pressing upon the parts underneath, whereby the viscid virus is separated from the side of the instrument, and very certainly lodged in the wound.

In several instances where a small piece of adhesive plaster was applied over the part inoculated, and allowed to remain for two days, a degree of ulceration was uniformly produced, and the virus seemed to be entirely thrown out of the wound, as no vesicle was afterwards formed. In consequence of this, I now never make any application to the part after the operation, but recommend it to be freely exposed to the air until the haemorrhage stops, and then I allow the part to be covered, or remain exposed, as it had been before.

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In children, whose skin is of a delicate texture, I have frequently observed a very considerable degree of redness extending in a circle around the punctured part, in the space of two or three minutes after the inoculation had been performed. This appearance exactly resembles the inflamed spot formed around the part which has been stung by a bee, and, according to my observations, indicates certain success from the operation.

When about to inoculate with virus which has been preserved for some time, whether in the usual way or in the form of crusts as above mentioned, it is necessary to reduce it again to a semifluid or viscid state. For this purpose, the smallest drop of water is to be put upon the dried matter, and carefully incorporated with it until the whole becomes one uniform mass. It may be necessary to add here, that when the crusts are to be used for inoculation, a small bit only, such as may be reckoned sufficient to supply matter for the
number

number to be inoculated, should be dissolved at a time, and the remainder still preserved in the dry state. Unless this is attended to, some change may be produced by the frequent solution and exsiccation performed before the whole crust be expended, which will diminish the efficacy of the virus. The portion of crust to be used will be found most easily reduced into a proper state for inoculation, by allowing it to remain, upon a small piece of glass, for a few minutes covered with a single drop of water; when it is somewhat softened by this means, it is then to be bruised and reduced into an uniform mass with any convenient instrument, as the flat side of a knife or shoulder of a lancet. It will be observed, that the mass, which is thus formed, assumes a white appearance, as if mixed with pus. This appearance, however, I apprehend is rather to be attributed to the presence of that portion of cellular membrane which formed the cells of the vesicle than to any real admixture of purulent matter. A little of the

matter

matter thus prepared is to be put upon the point of the lancet, and kept there until it becomes again so viscid as not easily to be rubbed off; the operation is then to be conducted in the same manner as when using virus taken immediately from the vesicle.

When the virus is preserved upon a piece of thread, as is frequently done, a slight incision is made in the part fixed on for the inoculation, and a small piece of the thread is put directly into it, and secured there by means of a slip of adhesive plaster. This is a mode of inoculating for cowpox which I conceive to be very uncertain, on account, as has already been observed, of the great propensity in the part to ulcerate, especially when covered with adhesive plaster.

In performing cowpox inoculation, I seldom make more than one puncture, preferring rather to repeat the operation in the course of a few days than to
double

double the feverity of the ailment. In cases, however, where the accession of smallpox may be dreaded, from exposure to the contagion of that disease, two punctures, in order to give a greater probability of the inoculation taking place, may perhaps be made with advantage, but it ought always to be a rule to make them at such a distance from each other as that the areola of each, when fully formed, may be quite distinct or separate.

After the virus has been inserted, I have known it lie in the part for fourteen days without giving any appearance of having taken effect; and yet, after this period, the affection has advanced regularly through all its stages, without any new inoculation having been performed: Such cases, however, are always to be considered as uncommon, and their progress must be very narrowly watched.

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S E C T.

S E C T. V.

Of the regular progress of the Local and Constitutional Affections of Cowpox.

ANOTHER circumstance of much importance to be attended to in conducting the inoculation of cowpox, that society may reap all the advantages which can result from that operation, is to ascertain that the whole affection proceeds through a regular course. This regards, 1st, the local affection, or state of the part where the inoculation
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has been performed, and, 2dly, the general or constitutional affection.

1st, Of the Local Affection.—The whole of the phenomena attending the regular progress of cow-pox, as they appear at the part where the inoculation is performed, have already been described; I shall here, therefore, only recapitulate the appearances which may be observed at four stated periods in the progress of the affection when regular; appearances with which it is, in my opinion, absolutely necessary that every person who undertakes to conduct this new inoculation should be familiar, and should positively ascertain, by actual examination, before he can give a decided opinion concerning the regularity of the local affection.

The first of these periods is about the end of the third, or beginning of the fourth, day from the time at which the inoculation was performed, when a small inflamed spot may be observed at the
part

part where the virus was inserted, which, on passing the finger over it, is found to be elevated and hard.

The next period is about the end of the seventh day. At this time, the vesicle is of considerable magnitude, of a circular or oblong figure, according to circumstances, having a turgid well defined margin, and a considerable depression in the centre, where a small crust is formed, appearing to fix the central part to the parts underneath. The less redness and hardness around the base of the vesicle until after this period, the more truly is it characteristic of the regular cowpox affection.

The third period at which it is necessary to examine the progress of the cowpox affection, in order to form a judgment of its regularity, is about the end of the tenth day. At this time the vesicle has attained its greatest magnitude, the central crust is much enlarged, and the margin of the vesicle appears very

very turgid, and divided into minute cells or vesicles, containing a watery or transparent fluid. The surrounding inflammation is now very considerable, and extends in a circle of from half an inch to one inch and a half in diameter. Close upon the vesicle, this inflammation is very deep coloured, approaching to livid, and the parts underneath feel very hard and tense. At this time also some hardness and swelling of the glands in the armpit is generally perceptible.

The fourth period for the examination of the cowpox affection is about the end of the thirteenth day; then the surrounding inflammation has entirely disappeared, and the part where it was has a dingy yellowish appearance. The hardness which was felt around the vesicle at the last examination is also entirely gone, and the whole of the vesicle, with its contents, is formed into a hard crust or scab.

This crust appears elevated entirely above the skin
of

of the surrounding parts, is of a reddish colour, and, being formed from a pellucid fluid, is nearly transparent.

2d, Of the General or Constitutional Affection.—

Dr Jenner has declared, that it is only those who have undergone the constitutional, as well as the local affection of cowpox, who are rendered uninfected of smallpox by the new inoculation: It becomes, therefore, a circumstance of the very first importance, in conducting the inoculation for cowpox, to be able to ascertain the presence of the constitutional affection. In many cases this, by a little attention, is easily accomplished; for soon after the areola begins to be formed, that is about the eighth day, the person becomes hot and feverish, and continues so for one or two days; and this feverish state is more or less plainly marked according to circumstances. In other cases, however, and these, according to the accounts given by authors, by far the most numerous, no fever can be detected; and

no other symptom, independent of the appearances of the local affection, which we shall afterwards find may be deceitful, has been mentioned, whereby we may judge concerning the presence of the antivariolous process in the constitution. In children, who are the most frequent subjects of cowpox inoculation, this absence of fever has been particularly noticed, it being remarked, that by far the greater number of them pass through all the stages of cowpox without any sickness being observed.

If the local affection of cowpox has proceeded regularly through all its different stages; and if each stage has been clearly and distinctly marked, we think ourselves authorised, from the united testimony of many eminent in the medical profession, to conclude, that the general affection, and, consequently, the antivariolous process, has taken place in the constitution, even although no fever may have been detected. But in many instances these different stages are not regular, neither are they distinctly marked ;
and

and how far these irregularities may take place without frustrating the purpose of the inoculation, and what may be the exact degree of the size of the vesicle, or of the surrounding inflammation and hardness, which is to mark a constitutional affection, or to assure us that the antivariolous process has been accomplished, we must confess we have no certain rule to determine. On this point, then, assuredly the most important to be ascertained in the progress of the symptoms of cowpox, every person is left to form his opinion from a comparison in his own mind of the case under consideration with what he may have read in the writings of authors, or with what he may have observed in other cases which, to his own knowledge, had proved effectual. But it will be allowed, that a judgment thus formed must often be very inaccurate, and thus bring disappointment, or worse, to all concerned, as well as discredit upon the new inoculation.

Again, it frequently happens in the inoculation for smallpox, that the part inoculated inflames, and

a pustule comes to be produced which contains virus in a pure and active state, capable of exciting the disease in others, without the person himself undergoing the constitutional disease of smallpox; or being, by the presence of this pustule on his body, rendered unsusceptible of variolous contagion at a future period.

The following history, related by Mr Dawson in the Transactions of the College of Physicians in London, Vol. III. at page 385, illustrates this: “ Last spring, (1772) I inoculated two children in one family; on the third day, there was a slight inflammation around the places of incision; on the fifth day, it was considerably increased, and the places felt hard on being pressed by the finger. I saw them again on the seventh or eighth day, and then the inflammation was much increased, extending nearly to the breadth of half-a-crown. Upon my applying a gentle pressure to the inoculated places, matter issued out of them; with which, as

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it issued from the arms of both patients, I perfectly saturated a cotton thread. With this thread I inoculated nineteen persons; every one of them had a fever and eruption of pustules at a proper time. But the children from whom the matter was taken did not sicken as was expected, and, on the eleventh day, the inflammation upon their arms was considerably abated; and two or three days after this, there remained nothing but a dry scab. Agreeably to the general opinion of the faculty, I told the parents that their children were secure from future infection of the smallpox. They, however, insisted upon their being inoculated again, which was accordingly done in the arm of each. Contrary to my expectation, their arms began again to be inflamed, and went on in the same manner as they had done before, till about the ninth or tenth day, when they sickened, had a smart fever for three days, and then an eruption of a considerable number of variolous pustules *."

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* See also several similar cases related by Mr Kite in the Memoirs of the Medical Society, London,

Here the local affection, though in itself perfect, had failed in communicating its influence to the constitution; and if this can take place in the cruel disease of smallpox, how much more readily may it be believed to take place in the mild ailment of cowpox. Such an instance as this occurring in cowpox, would form a case in which we have no guide to direct us; nay, the very symptoms we have been taught to trust as a sufficient mark of the presence of the antivariolous process, viz. regularity in the local affection, would appear only to mislead us. But that this is no idle conjecture, or painting of cases which analogy alone might lead us to dread, is proved from the writings of those most conversant with our subject. Dr Jenner himself has given us a case to show that, even in the casual inoculation, which is allowed to be the most severe way in which the ailment is communicated, the action of the virus of cowpox may be merely local. “Elizabeth Sarfanet lived as a dairy maid at Newpark farm in this parish. All the cows and
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the servants employed in milking had the cowpox; but this woman, though she had several sores upon her fingers, felt no tumors in the axillae nor any general indisposition. On being afterwards exposed to variolous infection, she had the smallpox in a mild way. Hannah Pick, another of the dairy maids who was a fellow servant with Elizabeth Sarfanet, when the distemper broke out at the farm, was at the same time infected; but this young woman had not only sores upon her hands, but felt herself also much indisposed for a day or two. After this, I made several attempts to give her the smallpox, by inoculation, but they all proved fruitless *.”

There are other instances also recorded, in which the action of the virus of cowpox has been merely local; and the following case, in which the virus of cowpox acted locally only, is so clearly marked, and so similar to the history related above concerning smallpox, that I must here beg leave to insert it. The case

* Vide Inquiry into the causes and effects of the Variolae Vaccinae, 2d edit. page 61.

case is mentioned in a letter from Dr Harrison to Sir Joseph Banks, and by him communicated to Dr Batty. “Upwards of twelve months ago, the nurse-maid and two children of my friend, the Reverend Marmaduke Allington of Swinop-house, were inoculated for the cowpox, with matter which had been sent from a great distance. Neither of the infants were infected, but the maid had considerable inflammation on the arm, and although it was not attended with indisposition, she remains insensible to the variolous impression. From the nurse were inoculated a female servant, a third child, and Miss Fanny Allington, who was then about five months old, had the operation repeated. The servant did not take the cowpox, but the children were supposed at the time to pass through it in an easy manner. Though I did not see any of the patients before they were inoculated for the smallpox, I had frequent conversations on the subject with the attending surgeon, Mr Sexty, who was always doubtful and dissatisfied with the experiments. From him, and some other respectable friends who

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have carefully inquired into the phenomena, I am informed, that in Fanny's arm the progress of the pustule was unusually rapid, and was characterised by an areola, that was neither extensive nor circumscribed. Mr Sexty is an accurate and respectable practitioner, but on account of other avocations, and his distant residence, the patients were only visited occasionally; and as there was no constitutional indisposition, Mr Allington paid them no particular attention. From these causes, the appearances on the incised parts cannot be minutely detailed, but I think a sufficient number of circumstances may be collected to enable us to come to a satisfactory conclusion on the subject. In both children, the incised parts were inflamed, and a fluid was produced, but they had neither eruption nor illness. With matter taken from the arm of Fanny, the maid was again exposed to the vaccine disorder. From her several others were infected, and, when the cowpox had been propagated through different subjects, Mr Allington's other child was likewise inoculated.

inoculated. Six months afterwards, they were all exposed to the variolous inoculation, and Fanny took the disorder. She had a mild smallpox, with a moderate eruption. Hence it appears that Fanny communicated a security against the smallpox to others although she herself remained liable to its influence *.”

Since the foregoing pages were put to the press, and while yet correcting the proofs of the present, I have had an opportunity of examining two cases in which the smallpox have appeared after the children had apparently undergone the cowpox affection; and I shall here state the particulars of these cases, in so far as I have been able to collect them.

J. M. was inoculated at the Institution in October last: on the third, seventh, and tenth days from inoculation, the local affection appears, from the books
kept

* See Medical and Physical Journal for February 1801, p. 109.

kept at the Institution, to have advanced regularly, but the child was not brought back for examination on the fourteenth day as is usual. About the middle of March following, this child is said to have been infected with the natural smallpox, which were then in its neighbourhood; as, after three days of smart fever, she had an eruption of about three dozen of pustules over her body; which pustules, from the description of the mother, remained out seven days, suppurated and dried into crusts. Another child, living in the same house, but who had not been inoculated for cowpox, sickened about the same time as J. M. and had a very numerous eruption of smallpox. On the 30th of March, that is about a fortnight after they were first taken ill, I saw both these children. On the body of J. M. there were many red marks remaining, but all the crusts had fallen off several days before: On the body of the other child a vast number of crusts remained, and left no doubt in my mind concerning the nature of the disease under which he had laboured. From the description
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of the mother of J. M. I was at first inclined to believe, that the disease with which that child had been infected was the chickenpox; but she, the mother, afterwards asserted that she well knew the smallpox, and was convinced that her child had the true kind; and this opinion is the more entitled to credit, that, upon minute inquiry, I could find no traces of the chickenpox in the neighbourhood; and that a brother of this child, who formerly was infected with the smallpox, but who never had the chickenpox, has not been infected with the latter.

The other instance alluded to, of the smallpox supervening after inoculation for the cowpox, is in the child of Mr B. This child had been inoculated for the cowpox upwards of twelve months ago; and in proof that the local affection advanced regularly, Mrs B. informs me that virus was taken from the vesicle for the inoculation of other children, and she was assured that the state of the affection was then such as to give hopes that the desired effect would be

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produced

produced by the inoculation. Some time afterwards, a younger child in the same family was also inoculated with the virus of cowpox, and went through the ailment regularly. Lately both of these children were inoculated with the virus of smallpox. The variolous inoculation on each advanced regularly; and, on the eighth day, the one who had been first inoculated with the cowpox, became hot and feverish; on the ninth day he had two fits, which were soon followed by an eruption of pustules; and these pustules were every way characteristic of the smallpox when I examined them on the twelfth day from inoculation. At this time the inoculated affection on the arm of the youngest child was evidently fading and drying up, although very considerable vesicication and surrounding inflammation, to the extent of the size of a sixpence, was still observable.

On making inquiry at the mother and nurse, I found, that the areola of the cowpox affection on
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the arm of the oldest child, who now had the smallpox, had not proceeded to nearly so great an extent as on the arm of the youngest, who completely resisted that disease. The surgeon, who inoculated the oldest child for cowpox, being immediately afterwards confined by sickness, did not see the progress of the affection, and I have not been able to trace what other children were inoculated with the virus mentioned by the mother to have been taken from her child. The eruption of smallpox is favourable, and the child doing well.

Such then are the particulars of these two cases, as far as I have been able to trace them; and although they may at first sight appear adverse to the opinion entertained concerning the antivariolous power of cowpox, and to the practice of the new inoculation, as a substitute for the smallpox; yet, on a serious consideration of the subject, they certainly do not warrant such inferences.

It has been ascertained beyond a doubt, and promulgated on the authority of the first medical men in the world, that when the human constitution has undergone the specific action excited by the virus of cowpox, the person is afterwards secure against all future attacks from smallpox. This fact, as a general rule, both Dr Farquharson and myself (and all others who have witnessed the antivariolous powers of cowpox even in a few instances), are bound to believe; for our investigations on this subject have afforded, as has already been observed, many and satisfactory proofs, in other cases, of the efficacy of cowpox as a sure preventive of smallpox: thus, besides those who have been inoculated by us with the virus of the smallpox, after having undergone the cowpox, and who have been thus proved to be unsusceptible of that disease, we have often found, that children, who had been inoculated for the cowpox, have eat, slept, and been constantly with those infected with smallpox in all the stages of this disease, and often in its very worst form,

yet

yet have remained completely insensible to its attacks. If, then, it should unfortunately happen, that the cowpox affection in some few instances, although it may have been apparently regular in the progress of the local affection, be not attended with the desired and usual effect, are we, from such instances, entirely to discredit the antivariolous power which is generally imparted to the constitution by the inoculation of cowpox? Certainly not; such instances should be regarded only as pointing out to us the necessity of investigating those causes which may thus operate in producing exceptions to the general rule, in order that they may be obviated.

It is well known, that the human constitution will resist the contagion of smallpox at one time, even although the person has not formerly been affected by that disease, and at another time suffer severely from its attacks. Similar causes may exist in the constitution, and render a person unsusceptible for a time of the particular action of cowpox;
and

and these causes, or others, may so act as to render the inoculation of cowpox, though, with regard to the local inflammation, it may appear perfectly regular, merely a local affection. Instances of this kind have already been detailed above; and it is thought that inattention to this circumstance, viz. that the action of the virus of cowpox may be often merely local, has been a fruitful source of error and disappointment in conducting the new inoculation. These instances of the mere local action of the virus of cowpox, which have been mistaken for the regular constitutional affection, very forcibly point out a desideratum, viz. *a test of a constitutional affection*, in conducting the inoculation of cowpox.

Having pointed out the difficulties which frequently present themselves in forming a judgment of the efficacy of the affection produced by inoculation with the virus of cowpox in preventing the smallpox, I would next observe, that if, on the one hand,

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we judge that the cowpox affection has been complete, when it has been only local, the person will still be left exposed to all the horrors of the natural smallpox, which a false judgment given, of absolute security from that disease, had taught him to despise. And if, on the other hand, we judge that the cowpox affection has been merely local, when it has in reality been general, we are induced to repeat the inoculation again and again; and as the appearances of each of these reinoculations will vary, and neither a regular vesicle, nor fever ever be produced, the same uncertainty will still remain, until at length the inoculation for smallpox itself comes necessarily to be performed. This, however, may not be consented to, before both the operator and the patient have experienced much trouble and anxiety, and are completely disgusted with the uncertainty arising from the inoculation of cowpox.

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An opinion too commonly adopted, that the conducting of the inoculation for cowpox is of so trifling a nature, as scarcely to deserve the attention of medical men; and that the affection, as being more safe and easy for the patient than the inoculated smallpox, may be given by any one, has also tended much to bring discredit upon the efficacy of this new inoculation. From this circumstance, persons, little acquainted with the affection, have yet engaged to conduct the inoculation of cowpox, and have brought disappointment and misery to all concerned. I have lately been informed, that the greater part of the children in two parishes in Scotland were inoculated in this way, (certainly with the best intention on the part of the operators), but the result was, that the smallpox came among them soon afterwards, and every one thus inoculated became affected with that dreadful disease, while those few that had been inoculated by persons acquainted with the appearances in cowpox entirely escaped.

Although

Although, therefore, the inoculated cowpox may, indeed, *as a disease*, be regarded as trifling, and little deserving the attention of medical men, yet as a certain preventive of one of the most loathsome and fatal distempers which affect the human race, it is of much importance, and highly deserving of the most minute attention from those who undertake to superintend its progress. The smallpox, communicated by inoculation, is easily distinguished from all other diseases, and there it is also easily known whether the affection has been constitutional or merely local; and therefore it is properly thought that operation may be conducted by people little accustomed to accurate observation on medical subjects. But until there be pointed out, and generally known, some unequivocal mark of a constitutional affection, which does constantly occur during the course of cowpox when effectual, and which may be as easily distinguished as the fever and eruption consequent to the inoculation for smallpox; this new inoculation ought certainly to be performed by those

alone who are well acquainted with every appearance of the ailment : For as much as it is more difficult to distinguish between the cowpox and some other affections, and also clearly to ascertain the presence of a constitutional affection, than to form a similar judgment in the inoculated smallpox ; the more does this new inoculation require attention to every symptom which may occur during its progress, in order that mankind may reap every advantage which has been promised from a general introduction of cowpox as a preventive of smallpox.

From the very first time that I had occasion to conduct the inoculation for cowpox, the uncertainty of the desired change being operated upon the constitution, partly from the apparent flightiness of the local ailment, but chiefly from a want of some well defined mark whereby to judge of a general affection, very forcibly presented itself to my mind ; and after having carefully attended to upwards of

six hundred cases which have fallen under my immediate care, I am thoroughly convinced, that some clear and well defined mark of a constitutional affection in cowpox, different from what has hitherto been observed by those who have written on this subject, is still to be regarded as the grand desideratum in conducting this new inoculation: for until this be established, our judgment of the efficacy of the cowpox inoculation in preventing smallpox must often be formed with doubt and anxiety, and too frequently prove ultimately erroneous. The truth of these remarks will be best known to those most conversant with the cowpox inoculation, and who are accustomed to observe the great variety of appearances which the local ailment often assumes.

For some time after the introduction of the cowpox inoculation into medical practice, many cases were related in which an eruption of pustules, more or less numerous, was said to take place, similar to what happens in smallpox. While these reports

ports were propagated, and certified by men who seemed worthy of credit, even although no instance of the kind had come under my own observation, I entertained hopes of so conducting the new inoculation in every case as to obtain a certain and well defined mark of a constitutional affection : for if an eruption of pustules belonged to cowpox in any case, as a consequence of the peculiar fever or constitutional ailment thereby induced, I thought that one or two pustules might be made to appear in every case. It is well known, that, by irritating any part of the skin by the application of heat, of a stimulating plaster, or various other substances, we can produce a greater number of pustules in small pox upon that particular part than would otherwise have appeared ; and, judging from analogy, I expected that the same thing might have been effected in cowpox. Such trials I have made ; and although they were conducted with as much anxiety and care to produce pustules, as other persons seem to have taken to avoid producing them,

them, yet they have constantly failed; nay, these trials have now been made under such a variety of circumstances without effect, as to confirm me in the opinion, that an eruption of pustules, as a consequence of a constitutional affection, does not belong to cowpox.

Foiled in my attempts, so to conduct the inoculation of cowpox as to produce pustules, I recollected some experiments which had been made with regard to the inoculation of smallpox. It was found, that if the same person was inoculated every day until the fever induced by the first inoculation supervened, all the other punctures quickly advanced in their progress; and that, in the course of a day from the time the fever or general affection began, even that puncture which had been last made, perhaps only twenty-four hours before, equalled in maturity the one first made, perhaps eight or nine days before, and from which the fever had arisen.

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In this case, it appears to me evident, and I think must be admitted by every person, that even had no other pustules appeared on the body than those occasioned by the repeated inoculations, nay, had there even been no fever observed in consequence of the inoculation, yet as the pustule occasioned by the last puncture had been suddenly accelerated in its progress to maturation, at the time the general or constitutional affection should have appeared, this alone was a sufficient proof of the variolous action in the system.

Judging again from analogy, I expected that the same thing, which thus happened in the smallpox inoculation, might also take place in that for the cowpox; and the unexpected appearance of one or two vesicles upon children that I had inoculated, which vesicles were quite characteristic of the ailment, and the appearance of which I could only account for from a second and accidental inoculation during the

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the course of the disease, as mentioned page 106, strengthened my hopes. And certainly, if we find in cowpox, where the inflamed and hard areola does not take place, at least in the regular course of that affection, until the end of the seventh or beginning of the eighth day from inoculation, that a second inoculation, performed for example at the end of the fifth or beginning of the sixth day, is so much accelerated in its progress, about the time the general affection of the system usually takes place, as to have an areola formed within a few hours, or very shortly after the first, and that this areola increases with the first, and again fades at nearly the same time, we must be struck with the similarity, and forcibly led to draw the same conclusion in the one case as the other, viz. that although the inoculated affection had appeared very slight, and no fever had been observed, yet that a certain action had been excited in the constitution. That this was the true constitutional affection of cowpox, may be judged by the acceleration of the
second

second vesicle to a state of maturity, five days before this could have happened had there been no consentaneous general action or change in the system.

The truth of this opinion was also soon put to the test of experience ; and I have now much satisfaction in declaring that the result appears to answer my most sanguine expectations.

I shall, therefore, lay before my readers, for their consideration, some of the particulars of my observations on this important point ; and I trust, the evidence to be offered will justify me in asserting, that by a second inoculation, performed at a certain period in the progress of cowpox, a clear and well defined mark of a constitutional affection may be obtained in every instance in which the ailment is effectual. I shall, in the first place, detail several cases in which the double inoculation was performed, with such remarks as were noticed at the time ; and then

then give some plates exhibiting a comparison between the primary and secondary vesicles, which have been executed by very accurate artists.

FIRST CASE.

W. C. was inoculated for cowpox at the Institution, on the 28th November, by one puncture in the left arm. On the 2d December, the infection having taken place and made considerable progress, he was reinoculated in the other arm.

From inattention of the parents, this child was not brought back until the 12th; at which time there was scarcely any perceptible difference between the appearances on the arms, and both affections were dried into the proper crust. On examining the mother, I was told that the inflammation around the base of each vesicle had begun and

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faded at nearly the same time, and that both affections were at the height on the tenth day from the first inoculation.

SECOND CASE.

R. M. was inoculated at the Institution on the 2d December, by one puncture in the left arm, and, four days afterwards, by another puncture in the right arm. This child was not brought forward again for examination until the 12th; at which time the affection on each arm appeared to be at the height, and both were quite characteristic of cowpox. The mother informed me that the redness around each vesicle had begun on the same day, and at the time of examination, no difference, with regard to the maturity of the affections, was observable.

THIRD

THIRD CASE.

W. G. was inoculated on Thursday the 10th December, at noon, for cowpox, by one puncture in the left arm.

15th, The inoculation having taken effect, and the vesicle having advanced regularly, he was this day, at noon, again inoculated, from the same stock of virus, in the right arm.

17th, The vesicle of the first inoculation has advanced regularly, and the inflammation is just beginning around its base.

The second inoculation shows every appearance of having taken effect.

19th, The appearance of the first inoculation is quite

quite regular; and the hard and inflamed areola is very complete.

The vesicle of the second inoculation is of the size of one at the end of the fourth day, but has a well formed areola around it, of the size of a sixpence, with considerable hardness. The redness around this second vesicle was observed last night at bed-time, so that it must have begun in little more than three days from the time of inoculation, and nearly four days sooner than it began to appear around the vesicle of the first inoculation, or than is usual in the regular cowpox affection.

20th, The vesicle of the first inoculation is perfectly characteristic, and the central crust is increasing. The inflamed and hard areola is evidently at the height, and about the size of half-a-crown.

The vesicle of the second inoculation appears very little, if at all, increased since yesterday; and there is

a central crust forming. The areola is more inflamed and hard than yesterday, and also rather larger, giving the whole the exact appearance in miniature of the cowpox affection on the ninth day when regular.

21st, The vesicle of the first inoculation is nearly all converted into crust, and the areola has faded much.

The vesicle of the second inoculation is still about the same size; the areola more red and hard than yesterday. The child was observed to be a little fretful in the night, but no increase of heat was perceived by the nurse.

22d, The vesicle of the first inoculation is completely dried into the characteristic crust, and the areola quite gone. The vesicle of the second inoculation is still of nearly the same size, and appears white around the central crust as on the tenth day in the regular affection.

affection. The redness and hardness of the areola are greatly diminished since yesterday. Twelve complete days from the first inoculation, and seven since the second.

23d, The crust of the first inoculation is quite firm. The vesicle of the second inoculation is nearly dried into a crust, and the surrounding inflammation and hardness almost gone.

24th, The crust of the first inoculation still firm and quite characteristic.

The vesicle of the second inoculation is also formed into the characteristic crust, which is in size equal to about one-sixth part of the first. The areola was completely gone at bedtime last night.

Thus it appears, that the areola of the first affection began to form about the beginning of the eighth

eight day, and the areola of the second about the beginning of the fourth day, from the time of their respective inoculations; that they advanced to maturity, and faded at nearly the same time; so that the first ran its course in thirteen days, while the affection from the second inoculation finished its course in about eight days. The progress of the second inoculation has therefore been accelerated five days before that of the first, and before what is common in the regular cowpox affection.

FOURTH CASE.

W. P. was inoculated on the 16th December in the left arm with the virus of cowpox.

23d, The vesicle is advancing. This being the end of the seventh day, and as yet no areola beginning to appear, I inserted virus, which was taken from the vesicle on the left arm, into the right arm, and also virus taken from another child into the
 same

same arm, viz. The upper puncture being made with virus taken from the left arm; the lower puncture with virus taken from another child.

26th, An areola began to appear around the first vesicle only last night, which is considerably more late than usual, being nearly the middle of the tenth day from inoculation; it is now well formed, and the affection quite characteristic.

Both secondary punctures feel hard, and there is a considerable degree of redness around them, which was first observed this morning, *i. e.* in rather less than three full days from the time of inoculation.

28th, Areola of the first inoculation large, and very complete.

Two very small vesicles are now formed on the secondary punctures, each of these however has a well formed areola, nearly of the size of a shilling;
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and, on examination with a glass, these vesicles appear perfectly characteristic of cowpox. Both first and second inoculations appear, from the areola, to be this day at the height. The child was fretful last night, but not hot.

The lower vesicle of the second inoculation appears considerably larger and farther advanced than the upper one.

28th, The areola of the first inoculation is faded, both with regard to redness and hardness. The progress of the vesicle is regular.

The two vesicles of the second inoculation rather larger than yesterday; and the lower one still larger and more advanced than the upper one; both central crusts increasing, and the areola around them evidently declining. The secondary inoculations have, therefore, been accelerated to maturity, at least five days before the usual progress of cowpox:

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and, judging from the first appearance of the areola of each, at least seven days and a half before the first inoculation, and the areolae of each has appeared, arrived at its height, and again faded about nearly the same period.

29th, The inflammation and hardness was entirely gone from the first inoculation last night at bed-time, and the vesicle nearly dried.

The areola is gone from the vesicles of the secondary inoculations this morning, and these vesicles are both drying fast also.

30th, All the vesicles are dried into the proper crusts.

FIFTH CASE.

A. W. A. was inoculated on the 13th February, by one puncture in the left arm, with virus obtained by dissolving a portion of a crust which had separated from an inoculated cowpox vesicle about six weeks before, and which had been preserved by being merely wrapped in paper.

19th, The infection had taken place, and he was this day inoculated in the right arm with virus taken from the vesicle upon the left, which vesicle had quite the characteristic appearance of cowpox.

20th, The vesicle of the first inoculation is advancing regularly, and some hardness is perceptible around it.

The part punctured yesterday, is slightly red.

21st,

21st, An areola began to form around the first inoculated affection late last night, and is now very distinct.—A minute vesicle has formed on the part last punctured, and considerable redness has appeared around it this morning,—no heat or restlessness has been observed.

22d, The primary affection advances regularly. The vesicle of the second inoculation is rather larger than yesterday, and the areola is well formed. The whole affection appears equal in size to about one-sixth of the first inoculation.

23d, The areola of the first inoculation is much faded, and the central crust is increasing. The areola of the second inoculation is also fading, and the vesicle drying.

25th, Both vesicles entirely formed into the proper crusts. No heat nor restlessness have been observed on the child during the whole course of the affection.

Many

Many more cases might here be detailed, in which a second inoculation with the virus of cowpox was performed several days after the first, and in which the acceleration of the second vesicle, to maturity, was in every respect as regular as those above mentioned; but it is thought, that those already given may be sufficient to illustrate the general fact—That if, during the regular progress of cowpox, a second inoculation be performed a certain number of days after the first, the affection produced by this second inoculation will be accelerated in its progress so as to arrive at maturity, and again fade at nearly the same time as the affection arising from the first inoculation; and that this will take place although the constitutional affection be so slight as otherwise to pass unnoticed.

Having ascertained this important fact, the next thing to be considered was, how to apply it in practice so as to be productive of the greatest advantage in conducting the inoculation for cowpox. The
desideratum

desideratum was *a clear and well defined mark* of a constitutional affection which should appear in every case in which the inoculation was effectual ; and it appears that this may be obtained by performing a second inoculation at such a period as, on the one hand, to afford the greatest contrast between the duration of the topical affections produced by the first and second inoculations ; and, on the other hand, to obtain the topical affection of the second inoculation distinctly marked with the peculiar character of cowpox. For the purpose of ascertaining the most proper period at which to perform the second inoculation, that the test might be obtained in the greatest perfection, the virus was inserted, the second time, in the following cases at different periods of the first affection, and the phenomena resulting were carefully observed.

SIXTH CASE.

M. D. was inoculated on the 9th January with virus of cowpox. The affection has advanced regularly; and this day (the 14th) she was reinoculated in the right arm with virus from the vesicle on the left.

15th, The first inoculation is advancing well, but as yet no areola is observed.

The second inoculation is a little red.

A third inoculation was this day performed with virus from the vesicle on the left arm.

16th, The first inoculation is advancing, and some inflammation is now appearing around the base of the vesicle.

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The second inoculation is a little red, and feels somewhat hard on passing the finger over it.

The third inoculation a little red, but not hard.

17th, First inoculation advancing, the redness and hardness around the vesicle being now very considerable.

From the second inoculation a small vesicle is formed with a central depression; but as yet there is no areola observable.

The third inoculation is merely a red speck, without any hardness.

18th, The areola of the first inoculation is still very distinct and large, and the vesicle increasing.

The vesicle of the second inoculation is very small, but distinct; and an areola was formed
around

around it in the course of the night, which is now
also very distinct.

The third inoculation is felt a little hard, and appears red, but there is no vesication nor areola to be perceived.

19th, The areola of the first inoculation is much faded, and the central crust is much increased.

The vesicle of the second inoculation is very distinct; and there is a beautiful ring areola around it, in size equal to a fixpence, and very hard.

The third inoculation appears more red than yesterday, and a small vesicle, or rather tumor, is formed on the part punctured, but no areola can be observed.

20th, In the first inoculation the central crust is increasing, and the areola has nearly disappeared.

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In the second inoculation, the vesicle is elevated and distinct, and the central crust is increasing. The areola has also nearly disappeared.

In the third inoculation a small areola is said to have been very distinctly observed last night, but it is now altogether gone.

This child was observed to be more fretful than usual during the two preceding nights, but was neither hot nor thirsty.

21st, The vesicle of the first inoculation nearly dried into a crust. Areola quite gone. The vesicles of the second and third inoculations are also much shrivelled, and the inflammation altogether gone.

SEVENTH CASE.

G. C. was inoculated for cowpox on the 15th
December.

December. The infection took place ; and on the 23d the vesicle was quite characteristic, but no areola had then appeared. He was then inoculated in the right arm with virus that had been kept four days, and also, in another part of the same arm, with virus from the vesicle on the left arm.

25th, An areola was very distinct around the first vesicle yesterday at noon, and this day it appears very complete. Both secondary punctures appear a little inflamed, but no hardness is felt in them.

27th, The areola of the first inoculation is quite gone, and the vesicle drying fast into a crust. Both secondary punctures felt a little hard yesterday and this day ; but the redness is now entirely gone, and very slight hardness only remains.

RIGHTH

EIGHTH CASE.

J. J. was inoculated by two punctures on the left arm on the 20th January. Into the upper puncture was inserted fluid virus, and into the lower one a solution of a small piece of crust, which had been kept about six weeks. Different lancets were used for these operations.

25th January, Both punctures have taken effect, and the upper one seems rather the farthest advanced. Virus taken from the lower vesicle was this day inserted into the right arm.

27th, An areola began to form around each of the primary punctures this morning, and they appear now to be equally advanced, and are both quite characteristic of cowpox. The part where the second inoculation was performed feels hard, and is a little elevated, but there is as yet no areola.

28th,

28th, The areola of the two primary vesicles is complete, and the vesicles advance regularly. On examining the second inoculation with a glass, a beautiful small vesicle is seen, which is quite characteristic of cowpox. An areola began to appear around this second vesicle this morning, and is now (at three, P. M.) in size equal to a sixpence, and very complete; the whole exhibiting a beautiful miniature of a primary affection. The child has been a little fretful, but neither hot nor flushed.

30th, The vesicles of the first inoculation are drying up fast, and the areola of each is greatly faded.

The vesicle of the second inoculation is very distinct, and the areola continued very red and hard during yesterday, and until this morning; it is now evidently declining.

February 1st, All the vesicles are completely dried, and all inflammation is entirely gone. The crust formed upon the secondary vesicle was this day so loose

loose as to be easily removed, and left the part underneath quite whole.

In this case, the areola of each of the vesicles of the first inoculation began to appear about forty hours after the second inoculation was performed, and the areola of the secondary vesicle began to appear during the third day from inoculation, and about twenty-four hours after those of the primary vesicles. The first inoculation ran its course in eleven days, the second in six; the latter was therefore accelerated five days, and the vesicle and areola of the second inoculation were for two days distinctly marked with all the characters of cowpox.

NINTH CASE.

J. D. of a very feeble and delicate constitution, was inoculated five days since with the virus of cowpox: and this day, 11th January, was reinoculated

ed in the other arm with virus, which had been kept some days.

14th, The first inoculation advances very slowly, owing, perhaps, to the vesicle having been rubbed, and having discharged much fluid two days ago. No appearance of areola.

The second inoculation has failed. He was re-inoculated with virus from the first vesicle.

15th, Some redness appears around the vesicle of the first inoculation, but no hardness is perceptible. Vesicle looks well. The last made puncture appears red.

16th, The areola of the first inoculation is still very faint; but there is now some hardness to be felt.

The last inoculation is considerably advanced, and there is a faint redness around it. The child has been very hot and restless for two days past.

17th,

17th, The vesicle of the first inoculation is now advancing well, and the areola is very complete. The last inoculation is still more advanced than yesterday, and has a completely formed areola. The child has been much better since yesterday, and two teeth have made their appearance through the gums.

18th, The first inoculation is much the same in appearance as yesterday.

The last inoculation has a most beautiful ring areola, and there is considerable hardness around the vesicle.

20th, The vesicle of the first inoculation is drying fast, and all the surrounding redness was quite gone this morning.

The vesicle of the last inoculation is very small, but quite characteristic, and the central crust is increasing. The areola is still distinct, though much faded.

21st, The affection on both arms is quite dry, and all inflammation is gone.

In this case the progress of the affection appears to have been retarded for two or three days, probably from the febrile state induced by teething, as the areola of the first inoculation did not appear until the ninth or tenth day: But after the teeth had made their appearance through the gum, the affection became better marked, and proceeded with more rapidity.

TENTH CASE.

H. S. was inoculated on the 23d January, with a solution of part of a crust which had separated from the arm of a child about six weeks before, by one puncture in the left arm—and, at a little distance from this, fluid matter was inserted by an-

C c

other

other puncture. These operations were performed with different lancets.

30th, Both punctures have taken effect, and there is now no perceptible difference in their appearance. Although this be the end of the seventh day from inoculation, there is no appearance of areola.

Virus taken from the vesicle produced by the fluid matter was now inserted into the right arm.

31st, Both vesicles of the first inoculation advance regularly; and there is still no perceptible difference between them. Inflammation began to appear around each vesicle in the course of the night, and the areolae are now very complete.

The second inoculation appears only a little red,

February 2d, The areolae around the vesicles of the
first

first inoculation are evidently fading. No perceptible difference between the vesicles can be observed.

There has been considerable hardness in the part of the second inoculation yesterday and this day, but no vesication nor areola have been observed.

4th, The vesicles of the first inoculation are nearly formed into the proper crusts; and the areola of each is quite gone.

The second inoculation has never advanced beyond a slight hardness in the part.

ELEVENTH, TWELFTH, AND THIRTEENTH CASES.

R. G.—H. M. and J. M. were all inoculated at the Institution; the affection in each advanced regularly, and they were all reinoculated at the end of the seventh day with recent virus. It appears, from the reports of the mothers, that an areola was
formed

formed around each of the primary punctures early on the eighth day from inoculation; and that no vesication nor areola was produced by any of the secondary punctures, but that a degree of hardness, and very slight redness, was observable in them for two days.

FOURTEENTH CASE.

J. H. was inoculated with virus of cowpox, in the left arm, on the 23d January. The infection had taken place; and, on the 29th, he was re-inoculated in the right arm with virus from the left.

30th, The first inoculation advances regularly.

The second inoculation seems to have taken effect.

February 1st, The areola of the first inoculation began to form yesterday afternoon, and is advancing well, but is rather more late than was expected.

The

The Second inoculation is a little red and hard, but no areola appears.

2d, The areola of the first inoculation is evidently declining.

A considerable degree of inflammation is said to have been observed around the part of the second inoculation last night and this morning, but it is now entirely gone.

4th, The vesicle of the first inoculation is formed into the proper crust.

The second puncture is still somewhat hard, but no more inflammation has been observed, and no vesication seems to have taken place. The child was very hot and restless during the two preceding nights.

From these, and a great many other cases in which the second inoculation was performed at different periods

periods of the primary affection, it is concluded, that the most proper time for performing the second inoculation is about the end of the fifth or beginning of the sixth day from the first inoculation. If the second inoculation be delayed beyond the sixth day, the affection produced by it will be very indistinct, and of short duration; and, if performed at an earlier period than the fifth day, the contrast between the progress of the two affections, with regard to duration, will not be so great as may be thought necessary.

These observations, however, are applicable to those cases only in which the first inoculation advances by a perfectly regular course, and in which the areola begins to form about the end of the seventh or beginning of the eighth day; for in those cases in which the first inoculation is, from certain causes, accelerated or retarded one or two days, as frequently happens, then the second inoculation should be performed at a more early or late period accordingly.

In short, my observations on this point lead me to conclude, that, in order to obtain the proposed criterion in the greatest perfection, the second inoculation should be performed between thirty-six and forty-eight hours before the areola of the first inoculation begins to appear. This is necessary, in order that the secondary affection may have proceeded some length, and that a small vesicle containing virus may have been formed by it, before the constitutional action from the first inoculation begins, otherwise no areola, but merely a slight degree of hardness, will take place from the second puncture.

As, on the one hand, the acceleration of the second inoculation in the manner above mentioned is to be regarded as a certain mark of a constitutional affection in cowpox, so, on the other, if it shall be found that no such acceleration takes place, but that the second inoculation proceeds through all the stages, and has the duration of a primary affection, it is to be concluded, that no constitutional action has taken place from the first insertion of the virus ;

rus ; and when this is the case, the second inoculation must be regarded as a primary affection, and a third puncture be made according to the plan laid down for conducting the second inoculation ; and thus we may go on until the proper test be obtained, or until we be satisfied that the constitution completely resists the action of cowpox.

When I first laid an account of this test of a constitutional affection before my medical friends for their opinion, it was supposed by some of them, that the areola formed in the second inoculation might be merely accidental ; that it might be occasioned by any febrile affection, whereby the absorption of the virus from the vesicle was promoted, and, consequently, that this acceleration of the second inoculation might take place independently of any specific action excited in the constitution by the virus of cowpox. Although this supposition appeared to me improbable, because when any febrile affection had occurred in children under inoculation,

lation, as from teething, &c. I had constantly observed, that the progress of the local affection was rather retarded than accelerated ; yet as this was a circumstance of much importance to be ascertained, it was determined to make observations respecting it ; and for this purpose the following opportunities lately occurred.

My friend Mr A. Gillespie was called to visit a child very ill from confluent smallpox : he found another child in the same family who had neither been infected with the smallpox nor the cowpox ; this child he immediately inoculated with the cowpox : the ailment advanced regularly, and he completely resisted the contagion of the smallpox, although he was constantly in the house with his brother during the whole of his illness. A few days afterwards, another child living in the same house, but not of the same family, was brought to Mr Gillespie, when visiting the above patients, to know what was proper to be done to prepare him for the

D d

smallpox,

smallpox, or to prevent that disease if possible ; Mr Gillespie advised the immediate inoculation for cowpox, intimating, at the same time, that as the child had certainly been exposed to the infection of smallpox, there was some chance that the disease in him could not be prevented. The inoculation was accordingly performed on the left arm on the 15th of March. The infection took place, and the symptoms advanced regularly, though slowly. On the 21st, he was reinoculated in the other arm. On the 23d, the first inoculation continued to advance slowly, and the second inoculation showed every appearance of having taken effect : but as yet there was no areola observed around either of the vesicles. On the 24th in the morning, the child was observed to be very hot and feverish, and continued so during the whole of next day ; in the course of which several spots appeared over his body similar to an eruption of smallpox. On the 26th, the fever had disappeared, the child being quite cool and hearty, and the eruption was more distinct and evidently

dently that of smallpox. In the course of this day, and not before, an areola of considerable extent formed around the vesicle of the first inoculation, and one, much smaller but quite distinct, was also observed around the vesicle of the second inoculation. Thus it appears, that the smart fever of smallpox, which continued at least two complete days, had no effect in producing the areola around the cowpox vesicles, although one of them had advanced nine days, and the other three days, before that fever supervened; but as soon as the fever of smallpox disappeared, an areola was formed around each. These areolae continued evident for two days; and then both vesicles gradually dried into the proper crusts. The pustules of the smallpox were distinct, and the child was soon quite well.

Another child, living in the same house, and who had also been exposed to the same source of smallpox infection, was also inoculated by Mr Gillespie with cowpox on the 21st; the inoculation ad-
vanced

vanced regularly ; and on the 26th the child became hot and feverish, and continued so for three days, during which, although a vesicle had been formed from the cowpox inoculation, yet no appearance of areola could be observed around it. On the 29th, an eruption of smallpox appeared which was favourable ; and the child was soon after quite free from fever. On the 31st, and not before, an areola was observed around the cowpox vesicle ; and on the 1st of April, the appearance of the inoculated affection was quite characteristic of cowpox at the height. Within the areola of the cowpox affection several pustules of smallpox were observed, which advanced regularly to suppuration *.

These cases prove, that it is not every fever which will accelerate the formation of the areola in the cowpox affection ; and from them it would appear, that the action excited in the constitution by the
virus

* Mr Gillespie very politely afforded me frequent opportunities of examining the progress of the symptoms in both these children.

virus of cowpox, and the contagion of smallpox, is different : They also give additional cause for believing that the acceleration of the secondary inoculation to maturity is the effect of a specific action in the constitution, which can be no other than that excited by the virus of cowpox, and, consequently, that this acceleration of the second inoculation may be relied on as a sufficient test of a general or constitutional affection.

I have thus described a mode of obtaining such a test of a constitutional affection in cowpox, as, I trust, will be found effectual : and it is hoped that this description has been given in such a manner as both to induce and enable others to follow the plan proposed. The grounds upon which the criterion itself is founded, the ease with which it may at all times be put in practice, the success with which it has hitherto been attended, and, above all, the satisfaction arising from being assured of the important point it is meant to ascertain, will ensure it farther trials ;

trials ; of the success of which I can at present see no reasonable cause of doubt. It is, therefore, to be wished, that this criterion may soon be generally practised as an improvement of much importance in conducting the inoculation of cowpox, as at once giving confidence in the extent of the ailment, and precluding all necessity for inoculation with the virus of smallpox afterwards.

EXPLANATION

EXPLANATION

OF THE

PLATES.

PLATE I.

THIS plate represents the progress of the cowpox affection, on four different days, as it appeared on the arms of a child in whom the double inoculation was performed. The child from whom the drawings were made was of a delicate habit, and in him the progress of the cowpox affection was protracted

tracted at least two days beyond the usual period. From this circumstance the second inoculation was not performed until the seventh day.

The figures in the left hand column represent the appearance of the vesicle and areola of the first inoculation on the tenth, twelfth, thirteenth, and fifteenth days; and the figures in the right hand column represent the appearance of the vesicle and areola of the second inoculation on the same days, which correspond with the third, fifth, sixth, and eighth days from the time the second operation was performed. Thus, on the tenth day of the first inoculation, which corresponds with the third day of the second inoculation, the first set of drawings was made, showing the affection on both arms to be advancing. On the twelfth day of the first inoculation, and on the fifth day of the second inoculation, the next set of drawings was made, which represents both affections about the height. On the thirteenth day of the first inoculation, and the sixth

sixth day of the second inoculation, the third set of drawings was made, showing the affection in both arms to be evidently on the decline. On the fifteenth day of the first inoculation, which corresponds with the eighth day of the second inoculation, the last set of drawings was made, which exhibit the affection on both arms very much faded, and the vesicles nearly dried into the proper crusts. In this case, the affection produced by the first inoculation completed its course in fifteen days, and the affection produced by the second inoculation completed its course in eight days.

In this case a beautiful ring areola was observed around the secondary vesicles for two days; but at no period, in the course of the affection, did the areola of the primary vesicle assume that appearance.

PLATE II.

THIS plate represents the progress of the affection of cowpox in another child, in whom the double inoculation was performed. In this case, the affection advanced regularly; and the second inoculation was performed on the beginning of the sixth day. The first two figures on a line represent the appearance of the vesicles of the first and second inoculation on the ninth and fourth days from the time of inserting the virus into each respectively; at which time both vesicles were advancing to maturity. The next two figures on a line represent the appearance of the affection on each arm, on the tenth day from the first inoculation, and fifth day from the second inoculation, at which time the areolae were fully formed, and the affection at its height in both arms. The last two figures

figures on a line, in this plate, represent the appearance of the affection on both arms on the twelfth and seventh days from the time of their respective inoculations. At this time, the surrounding inflammation was greatly gone from both vesicles, and these were drying fast into the proper crusts.

PLATE III.

FIG. 1. and 2. represent the appearance of the cowpox vesicle at the end of the fifth day, when the progress is regular. These show the appearance of the primary affection at the period when it is most proper to perform the second inoculation, in order to obtain the proposed test of a constitutional affection in the most perfect state; and, by comparing these figures with the vesicles of the second inoculation on the fifth day, as delineated in plates I. and II. an estimation may be made of the degree

degree of acceleration, which is occasioned in the progress of the vesicle of the second inoculation by the presence of the constitutional affection.

Fig. 1. represents the appearance of the cowpox vesicle, at the period above mentioned, when the inoculation is performed by a puncture.

Fig. 2. represents the appearance of the cowpox vesicle, at the same period, when the inoculation is performed by incision.

Fig. 3. represents the appearance of the local affection produced by the inoculation of smallpox on the eighth day after the virus had been inserted.

Fig. 4. represents the affection produced by the inoculation of smallpox on the twelfth day after the virus had been inserted,

By

By contrasting these last figures, namely fig. 3. and fig. 4. with the primary vesicles of cowpox about the period of their height, such a difference is easily perceived as to justify us in regarding the cowpox and the smallpox as totally different affections.

CHAP.

1st Day

3^d Day

12 Day

5 Day

13 Day

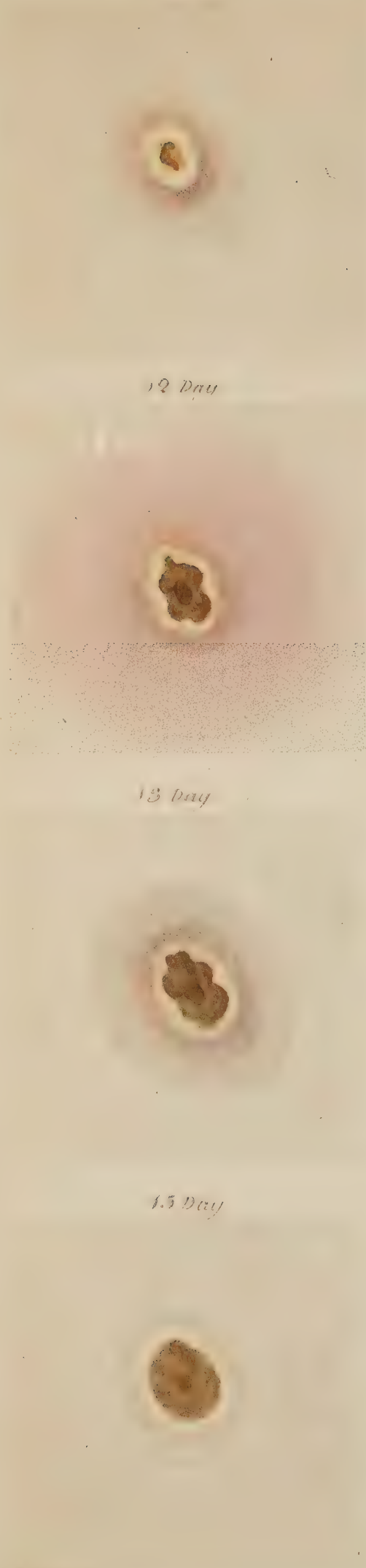
6 Day

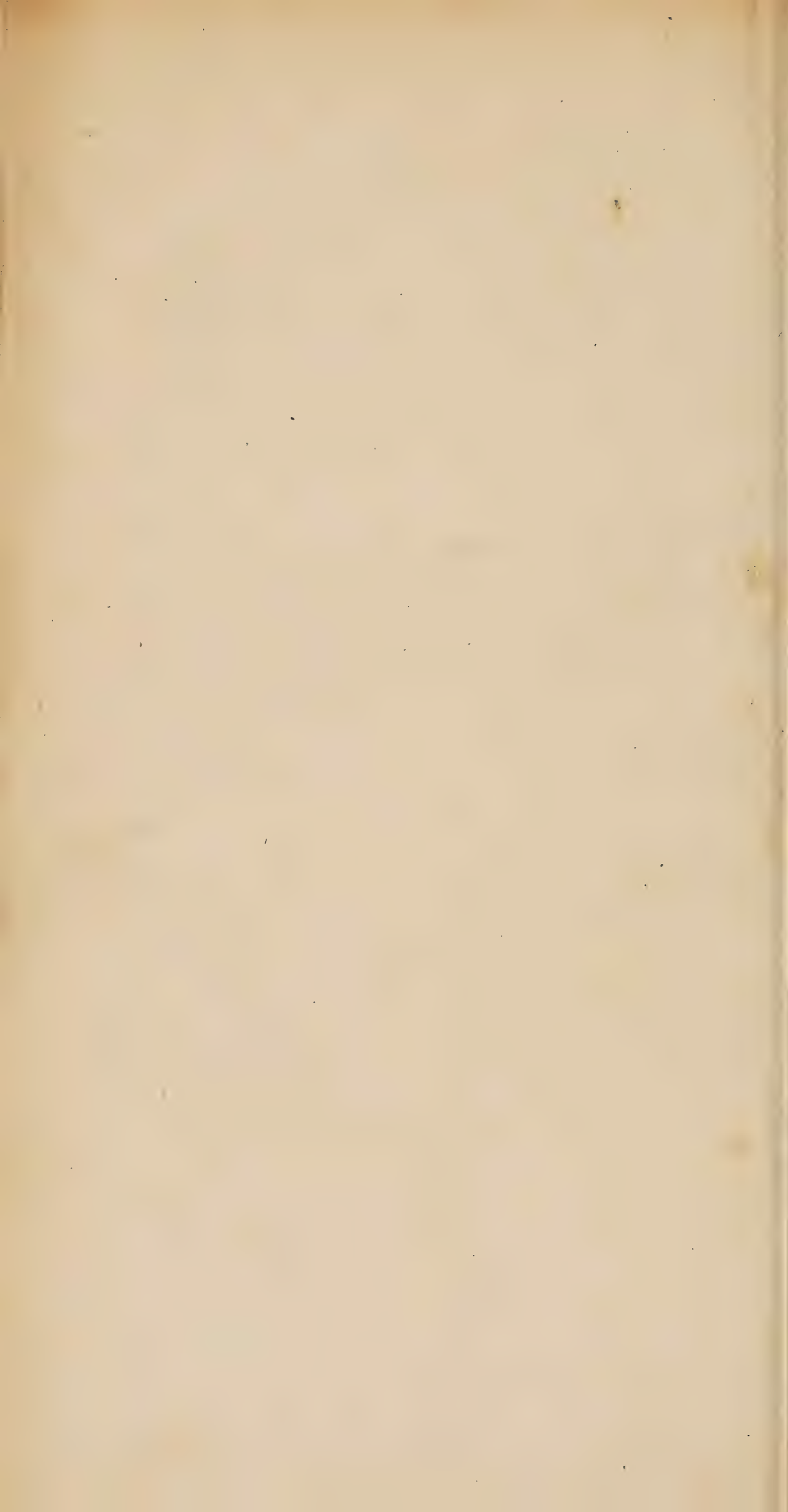
15 Day

8 Day

Vesicles of the 1st Inoculation.

Vesicles of the 2^d Inoculation.





Vesicles of the 1st inoculation.

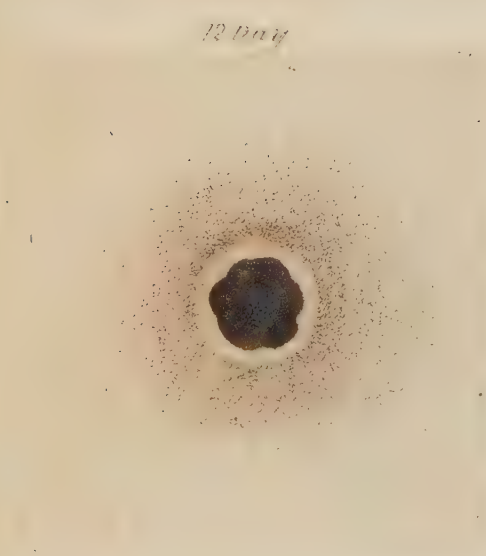


PLATE III.

Vesicles of the 2nd inoculation.

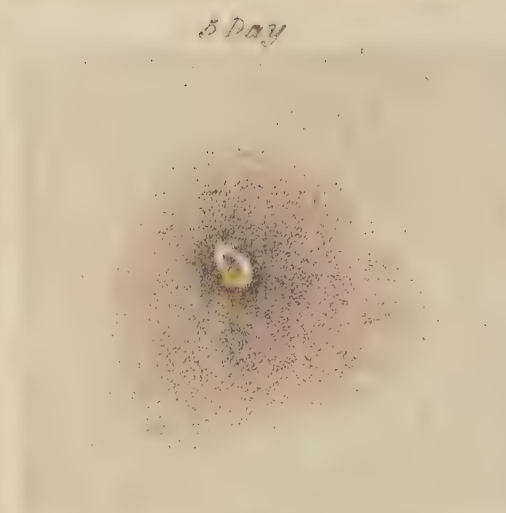
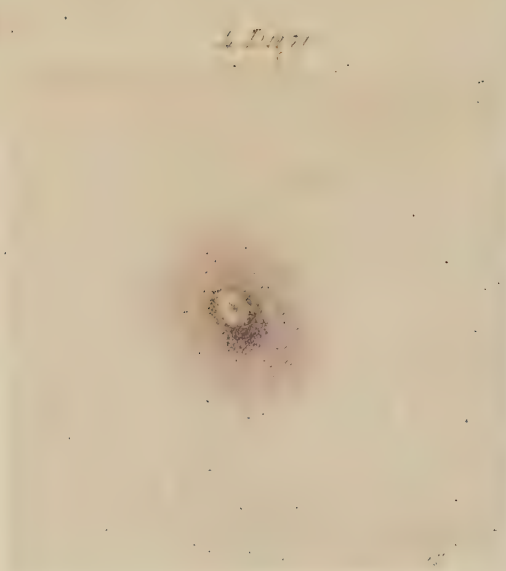
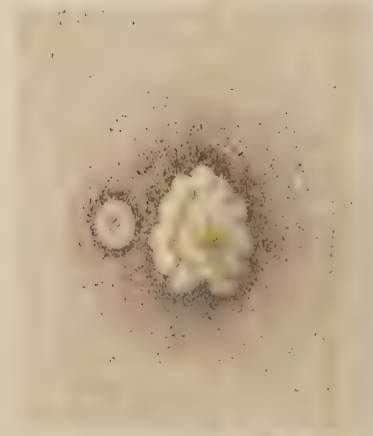


PLATE III.



C H A P. IV.

OF THE MEDICAL TREATMENT OF COWPOX.

FROM what has been said in the preceding pages, concerning the nature of cowpox, it will appear that little is necessary to be done in the treatment of such a mild affection. In smallpox, it has generally been recommended, that the person should undergo some preparation by medicine before inoculation is performed. In cowpox, this is quite

quite unnecessary. As we find, however, that certain deviations from the regular appearance of the affection do sometimes take place, and as these deviations are frequently such as to defeat the purpose of the inoculation, it becomes of much importance to prevent them. Again, although the cowpox is, in ninety-nine cases out of a hundred, or perhaps in a much greater proportion, so mild as not to deserve the name of a disease, yet, occasionally, cases occur in which the symptoms both of the local and of the general affection are more severe than is necessary, and such severity of symptoms it will always be proper to moderate.

These considerations present us with the two following indications in the medical treatment of cowpox.

- I. To prevent any irregularity in the course of the local affection.

II.

II. To moderate the symptoms both in the local and in the constitutional affection, should these prove more severe than is necessary.

It has already been observed, in a former part of this Essay, that, from various causes, the inoculated vesicle may be broken, and the contents effused at such periods in the progress of the affection as may either altogether prevent the success of the operation, or afterwards prove troublesome by producing obstinate sores. When the vesicle discharges its contents before the areola is formed, that is, before the seventh day, and especially if a constant oozing follow, no constitutional operation, preventive of smallpox, can be expected to take place. The utmost care is therefore necessary to prevent such an accident. This may in general be done by avoiding the friction of the clothes upon the vesicle. It is also necessary to prevent the person from picking or scratching the part, and this requires some attention on

the part of the attendants, as considerable itching is commonly felt during the first stages of the ailment. But should unfortunately the vesicle be already broken and be discharging its contents, then remedies must immediately be applied in order to check the farther effusion of the fluid. For this purpose it will frequently be sufficient to keep cloths, which have been previously dipped in cold water, upon the part for some time; renewing these occasionally, in order that the astringent power of cold may be applied in full force. When this is insufficient for the purpose, recourse must be had to some more powerful astringent, and, as such, the diluted vitriolic acid, and the acetite of lead, are both very efficacious. A single drop of either of these fluids is to be put upon the vesicle, where broken, with the point of a probe, and suffered to remain for one or two minutes, and then, cloths dipped in cold water may be applied as already recommended; by these means the discharge will be stopped, and the course of the affection will again become regular.

When

When the vesicle discharges its contents at a more late period of the affection, whether from a particular disposition in the part, or from the central crust, which is very easily detached at any time between the ninth and twelfth day, being forcibly removed, and the whole seems inclined to degenerate, or has already degenerated, into a foul and troublesome sore, with an ichorous discharge, so acrid as to occasion a scaly eruption upon the neighbouring parts, recourse must still be had to strong astringent and to escharotic applications. Besides those already mentioned, an ointment formed of the red oxyd of mercury, with simple cerate, will be found a remedy of particular efficacy in this state of the affection. If the inflamed and hardened areola has been observed, the healing of the sore should be effected as soon as possible, without attending to the formation of the semi-transparent crust, in which the ailment generally terminates. But, if the inflamed and hardened areola, or other marks of a constitutional affection have not
been

been observed, then the operation must be regarded as having failed, and the inoculation is to be repeated.

In delicate and weakly children, in whom there seems little tendency to inflammation and absorption, and in whom, consequently, the contents of the vesicle may be dried into a crust without entering the circulating system, (instances of which, I suppose to take place in those cases where the proper, or a semitransparent crust, is formed about the eighth day without the appearance of areola,) it is of much advantage to apply some stimulant application to the part in order to induce absorption; and one of the most powerful and best adapted for this purpose is heat. Let the part be moderately warmed before the fire, two or three times in the day, and afterwards covered with cotton. This I have frequently ordered, and seen used with good effect.

II. The second indication is to moderate the symptoms both in the local and in the constitutional affection, should these prove more severe than is necessary.

The only symptom in the local affection, which can require to be moderated, is the inflammation. Some cases are mentioned by authors, in which this symptom has proceeded to an alarming degree. These, however, are very uncommon ; and it appears to me, that their cause has, in general, been such as may be easily avoided ; I mean the making a great many punctures near each other. From this circumstance, it will occur to every one, that not only the inflammation must be much increased, seeing each puncture produces a vesicle with an areola, but also that the accompanying general affection must also be made more severe. To avoid this cause of severe inflammation, I have recommended, that only one puncture be made, at least in one arm ; and that this should rather be repeated,
if

if it has failed, than the patient be exposed to the danger of a severe local affection; and I have the satisfaction of stating, that, from attending to this rule, neither Dr Farquharson nor myself have ever seen an instance, among all those cases which have fallen under our care, in which the application of remedies, from an excess of inflammation, was required. Such, however, have been related by others; and the following mode of treatment has been recommended.

“ About the tenth or eleventh day,” says Dr Jenner, “ if the pustule has proceeded regularly, the appearance of the arm will almost to a certainty indicate whether this,” viz. a degree of inflammation greater than what may appear necessary, “ is to be expected or not. Should it happen, nothing more need be done than to apply a single drop of the aq. lithargyr. acetat. upon the pustule; and having suffered it to remain there two or three minutes, to cover the efflorescence surrounding the pustule, with

a piece of linen dipped in the aq. lithargyr. compos. The former may be repeated twice or three times a-day ; the latter as often as it may feel agreeable to the patient *.” The application of strong mercurial ointment to the part inflamed has also been used with advantage, to moderate this symptom.

The affection of the axillary glands is seldom or never so great as to require medical assistance. Should it so happen, however, that considerable inflammation does affect them, cloths wetted with the aq. lithargyr. compos. and kept constantly applied, will be found a very efficacious remedy. Should a true erysipelas attack the arm during the course of the cowpox affection, it must be considered as a separate disease, and treated accordingly.

In children, the symptoms of fever, denoting a constitutional affection, are in general so slight as to escape

* Vide Continuation of Facts and Observations, &c. p. 36.

escape notice. In those more advanced in life, however, a considerable degree of fever is more common : When this takes place, attention to the state of the bowels, and giving once or twice a cooling purgative, is all that I have ever found necessary : cool air and abundance of cooling drinks are also highly proper.

Disturbed sleep, with dreaming and frequent startings, are common in all fevers ; but as occurring in the constitutional affection of cowpox, they have been thought, especially the latter, to be the forerunners of such fits as frequently take place before the eruption of smallpox. It has never happened to me to see fits induced by the inoculation, or the constitutional affection of cowpox ; such cases, however, have been related to me by practitioners, in whose accuracy I have entire confidence : And certainly, judging from what we know of the human constitution, we cannot wonder if, under certain circumstances, these should occur in persons
under

under the influence of cowpox. It is well known, that a morbid irritability is the great predisposing cause of such fits ; and, therefore, not only inoculation with cowpox should be avoided at those periods of life when great irritability prevails, as during the very early periods of infancy, and during the time of teething ; but also every thing should be avoided during the course of the ailment which may be supposed to induce or increase this irritable state. When the symptoms above mentioned, as the supposed forerunners of convulsion fits, occur, they will be best removed by a proper attention to the state of the bowels, by keeping the person perfectly quiet, and by a free exposure to cool air.

I have thus finished those practical remarks on conducting the inoculation of cowpox which my experience in that ailment has enabled me to make, and which I thought it my duty, as one of the surgeons to the Institution for the Gratuitous Inoculation of Cowpox, to lay before the

public. If they shall be found to contain matter worthy of notice, and especially if they shall contribute to forward the great cause, the general inoculation of cowpox, and, consequently, the final extinction of smallpox, my object will be fully accomplished : For what can afford more real satisfaction than the assurance of being accessory to the preservation of the lives, and to the alleviation of the sufferings of our fellow creatures ?

To those endowed with thinking minds, and with feeling hearts, I should deem it an insult to insist farther on the propriety of their giving every encouragement, both by example and by precept, to the general practice of the new inoculation, after what has been mentioned respecting the advantages which will accrue to society by the substitution of the inoculation of cowpox for that of smallpox :—But I well know, that there are amongst us, who either do not give themselves the trouble to think, even upon matters which so nearly concern their own happiness,

happiness, or, if they do think, their reasoning is like that of fools: “ Our forefathers,” say they, “ have had smallpox, and have done well; we also have had smallpox, and have done well! Why should not our children also be led in the same path? Why should we make innovations? Why trust ourselves out of the beaten tract pointed out by our ancestors?” For such persons, I here record the history of an unfortunate family, which is given me on the best authority, and to which I earnestly solicit their most serious attention. “ At —— lately occurred a melancholy history, but highly favourable to the inoculation of cowpox. A woman, named —— had five children; these she had determined to inoculate with cowpox. The operation was already performed upon two; and at that instant she was informed, and convinced, that it would answer no good purpose, as they would afterwards take the natural smallpox: on this account three of the children were not inoculated with the
cowpox.

cowpox. The two who were inoculated had the usual symptoms of cowpox. Some time afterwards the smallpox came; the three who had not undergone the cowpox were infected, *and one died*; and although the other two who had the cowpox slept in the same beds with those loaded with the natural smallpox, yet have they entirely resisted the attacks of this dreadful disease."

F I N I S.

ALEX. SMELLIE, Printer, Anchor Close.

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APPENDIX.

No. I.

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DR JENNER'S opinion concerning the origin of the Cowpox has been farther confirmed by observations made by Dr Sacco of Milan. This gentleman at one time not only doubted the validity of Dr Jenner's opinion concerning the origin of the cowpox, but imagined that he was in possession of facts tending to overthrow it completely. However, a singular circumstance happened to convince the Doctor of the fallacy of his former observations. One of his coach horses had the common malady of the heel ; his coachman attended to the sore, and presently exhibited several pustules upon his hands, with all the characteristic marks of those derived from the cow. It was deemed too late to take matter from them for inoculation ; but soon after this a similar case occurred on the fingers of a coachman of another gentleman in Milan. From these pustules Dr Sacco inoculated nine children and a cow. Three of the children were infected, and had the disease exactly in the same way as if it had been communicated from the cow. With matter taken from these children, other inoculations were performed ; and at the time that this account was transmitted, it had reproduced itself

correctly a fourth time. Dr Sacco also adds, that he had inoculated six other children with the matter of grease, and that on two of them it had produced pustules with all the genuine characters of the vaccine *. Some of this matter of grease as taken directly from the horse was sent by Dr Sacco to Dr De Carro at Vienna, and to Dr Friese, director of vaccination in Silesia; in the hands of both these gentlemen it was equally successful as with Dr Sacco. And we are informed that they now inoculate with equine, or with vaccine matter indiscriminately, being fully convinced of their identity †.

It is mentioned by Dr Joseph H. Marshall, that being called to visit a young woman, who was dairy-maid at a farmer's, he found her in bed complaining of a pain in her back, lassitude, and thirst. The face was flushed, and the tongue foul. Upon requesting her to give him her arm, he discovered upon the hand four or five large pustules, which, from his knowledge of the disease, he immediately ascertained to be the cowpox. "On the back of the hand there had evidently," he observes, "been a long scratch, on a part of which had been the primary pustule; the others were very near it."—"Upon making a strict inquiry," he adds, "I found that one of the cows had this disease, and that in several of the others it was also advancing. On farther inquiry, I also found that the farmer had a horse with sore heels in the stable, which his son always attended, who did not usually milk the cows, but that, one morning this cow being troublesome and restive, he had, to relieve the dairy-maid, milked her himself ‡."

* Medical and Physical Journal, vol. x. page 93.

† Vide *u. s.* vol. xvi. page 245.

‡ Memoirs of the Medical Society of London, Vol vi. art. 9.

“ In the latter end of April 1806, the cowpox appeared at
“ a farm in Dr Jenner’s neighbourhood. The disease was
“ regularly traced from a horse’s heel in the farm to the boy
“ who dressed him, and from him to the cows. Dr Jenner
“ sent notice of this event to Dr Adams of the smallpox hos-
“ pital, who, it will be readily supposed, would not lose this
“ opportunity of tracing a morbid poison. Dr Adams passed
“ the night at Berkley that the succeeding day might be devoted
“ to their inquiries. In the morning, the two physicians,
“ with the farmer, met at the farm. All the cows were exhibited;
“ the farmer being present, who gave the history of the
“ event with much simplicity, though with tolerable severity
“ when he came to describe the inattention of the boy. The
“ boy afterwards appeared in his own defence, and urged that
“ he had only milked two of the cows after the injunction he
“ had received: Unfortunately these were afterwards mixed
“ with the herd, and became infected before they were suspected,
“ in consequence of which the milkers carried the
“ infection to all the rest. It was not a little curious to remark
“ those cows which had suffered on a former occasion,
“ and who were easily distinguished by having the disease in
“ a milder form. Dr Adams brought some of the matter to
“ town with him, and has since used it in the hospital, to see
“ whether it were possible to distinguish between the effects
“ of matter immediately from the cow, and after it has been
“ for four or five years inserted only in the human subject,
“ but no difference could be perceived *.”

Mr Ring informs us, that the late Mr Davy shewed Dr Jenner and him an instance in which vaccine matter succeeded when inserted into the heel of a horse †.

* See Medical and Physical Journal for June 1806.

† *Vid. ut supra.* Vol. xii. page 536.

Mr Shoolbred of Calcutta has ascertained, that the cowpox is not indigenous amongst the cows in India, and was totally unknown to the Bramins in that country until introduced from Europe in the year 1802. He says, “ No farther information has been obtained respecting the knowledge of vaccine inoculation, pretended to be possessed in India by the Bramins anterior to Dr Jenner’s discovery : and there seems to be no doubt but the attempt to establish such a belief upon the authority of an interpolated passage of a Shanscrit book was a palpable imposition, contrived for no other purpose than to support the pretensions of the Bramins to the early possession of all useful and scientific knowledge*.”

As far as I have been able to learn, the cowpox has not been found upon the cows in any part of Scotland ; although eruptions very much resembling that disease are frequent : With fluid taken from vesicles on the hands of persons who had been infected by milking cows with eruptions on their teats, I have repeatedly inoculated the human subject ; but have never been able to produce any vesicle which had the characteristic appearance of the cowpox. It is worthy of remark, that neither in India, nor in Scotland, have persons employed to take charge of the horses any communication with the cows.

* See Report on the State of Vaccination in Bengal, page 50.

NO. II.

Supra page 57

ACCORDING to my observations, in conducting vaccination, it appears, that if any constitutional morbid action be begun and finished during the local action of the cowpox infection, (i. e. during the period between the time of inoculation and the beginning of the constitutional affection), the regularity in the appearance, and in the progress of the vesicle, may be considerably disturbed and retarded, but the local affection will afterwards assume the regular appearance, and vaccination will be complete. But, if the constitutional morbid action be present, when the constitutional vaccine action should begin, and be continued for five or six days after that period, the action of the cowpox contagion, having proceeded until the vesicle has attained its full size, will then be arrested in its progress, the virus will be gradually dried into a crust, and no constitutional vaccine action will be induced.

If, during vaccination, the contagion of the smallpox (and the same thing seems to obtain with respect to other mor-

bid poisons,) has been present in the constitution such a length of time as that the constitutional affection from the two poisons should take place at the same time, the constitutional affection which takes place will be either that from the cowpox or that from the smallpox, according to circumstances which we cannot explain. If this constitutional affection, however, be slight, and soon passes over, or if the two morbid poisons have been present in the body such a length of time as that the constitutional affection from each should take place in close succession, *and if the first be not very severe or long continued*, then a constitutional affection from each of the morbid poisons will take place successively*.

But if the constitutional affection from smallpox shall appear first, and be very severe, or continued above five or six days, the cowpox vesicle, after attaining its full size, will be dried up, and no constitutional vaccine action will take place; of which the following case, amongst many others of the same kind which I have seen, is a proof. — Jack, act. eight months, was inoculated at the Dispensary on the 21st of November 1807, after having been for six days exposed to variolous contagion from a sister labouring under a very full crop of the casual smallpox. On the 25th the inoculation had taken effect, but the progress appeared rather slow; she was therefore re-inoculated.—28th, The vesicles from the first inoculation were well formed, but not quite so far advanced or large as is usual at this period, and

* See the cases of the Nelsons mentioned at page 43, in which the natural smallpox appeared immediately after the constitutional affection of the cowpox; and the cases of the children mentioned at page 193 et seq. in which the constitutional affection of the cowpox immediately succeeded the constitutional affection of the smallpox, by which the former had been for some days retarded. I have had frequent opportunities of seeing cases similar to those above referred to since the publication of the first edition of these observations.

there was no appearance of an areola. The second inoculation had also taken effect. On the preceding night the child was observed to be feverish, and this day a copious eruption had appeared on the face and body.—29th, The vaccine vesicles are larger than yesterday; the eruption more numerous, and evidently the smallpox.—30th, The vaccine vesicles are now stationary, and there is no appearance of an areola.—The eruption advancing regularly, and is very numerous; still considerable fever present.—December 2d, The vaccine vesicles are drying up—no areola has ever been formed—smallpox pustules very numerous; and a considerable degree of fever present.—December 4th, Vaccine vesicles quite dried up, and the crusts are becoming loose; no areola nor hardness around the vaccine vesicles has ever been observed.—Pustules of the smallpox suppurating.

NO. III,

See page 65

THE superiority of the cowpox over the smallpox is still greater in the warm climates than in these more temperate regions, for while, in the former, the cowpox retains all that mildness with which we are accustomed to observe it in this country, the smallpox is there greatly more severe and fatal. "The Brahmins," says Mr Shoolbred, "who practice inoculation for the smallpox, acknowledge that they lose one in about two hundred; and the mortality from the smallpox caught in the natural way in India has been estimated at one in three who have the disease among the natives. Inoculation for the smallpox on children born of European parents in India," he adds, "is certainly much less favourable here than in Europe. In Europe one in 300 only dies; here," in India, "I believe I shall not err much if I say one in sixty or seventy. The great risk which thus attended variolous inoculation kept families every year in a state of inexpressible trouble and anxiety during the months in which the smallpox prevailed; and

“ the duties of the medical practitioner during this time became of course peculiarly harrassing and laborious*.”

Since the publication of the first edition of these observations, the numbers inoculated for the cowpox, in all quarters of the globe, must amount to many millions, while the instances of severe symptoms, or of any inconvenience arising from these inoculations, are so rare as scarcely to deserve being mentioned.

From the Report of the Royal College of Surgeons of London, it appears that out of 164,381 persons vaccinated, 56 are said to have been afterwards infected with the smallpox, 66 are reported to have had eruptions on the skin, and 24 to have had inflammation of the arm, of which three proved fatal†.

These failures and other untoward symptoms may be fairly attributed to various circumstances which, as practitioners become better acquainted with the appearances of the vaccine disease, and the laws by which its action on the human constitution is governed, will very certainly be obviated. With regard to the inflammation on the arm, this, I apprehend, cannot be fairly laid to the charge of cowpox; the same thing occasionally takes place in the inoculated smallpox, and in this respect the two diseases may be said to be upon an equality. In either of these diseases, however, I apprehend that any severe inflammation occurring at the inoculated part is rather to be attributed to other circum-

* See Report on the progress of vaccine inoculation in Bengal from the period of its introduction in 1802 to the end of the year 1803, by Jo. Shoolbred superintendant general of vaccine inoculation, page 19.

† See Report of the Royal College of Physicians of London on vaccination, Appendix page 11.

stances than to the peculiar action of the virus used for inoculation. Thus, from a particular state of the constitution, we find that the bite of a leech, the prick from a thorn, or even the scratch from a pin, will produce inflammation, erysipelas, and mortification, terminating in death; yet we cannot, in just reasoning, attribute this fatal termination to such a wound; but admitting that the inflammation in the above instances was altogether excited by the vaccine contagion on irritable constitutions, how much more certainly would the same inflammation have been induced by the more sharp and acrid virus of the smallpox.

The most severe inflammation, or sore arm, which I have ever seen after vaccination, was in a child that had been inoculated at the Dispensary here during the autumn of 1806. The child had been regularly brought to the Dispensary for examination during the progress of the affection, and was dismissed on the 14th day from inoculation. The mother went immediately after this to assist in the harvest, and carried her child along with her. The child, as the mother informed us, was laid down upon a coat or blanket upon the corn stubble, and had rolled about so as to injure the arm with the stubble by rubbing off the crust prematurely, thus irritating the part so as to induce inflammation, which was aggravated perhaps by exposure to frosty air, and a repetition of the same irritation for some days successively. When the child was brought to me about six or eight days after he had been dismissed from the dispensary, at which time I am perfectly certain the arm would have been quite well had it not been rubbed, &c. as above mentioned, there was a most violent degree of inflammation over the whole arm, extending from the points of the fingers over the whole of the shoulder and neck of the same side, but particularly severe over the shoulder. An ulcer of the size of a shilling occupied the place of the vaccine crust, and discharged a great quantity

of a thin watery matter, and there was present a very great degree of fever. By the application of proper remedies the tension, pain, and swelling gradually diminished, and in the course of eight days the arm was again quite well. Had the mother in this case continued to neglect her child for one or two days longer, it is almost certain that the arm would have mortified, and perhaps the child would have died; but had this been the case, is there any unprejudiced mind that could have in justice attributed such an event to vaccination? even the mother of the infant herself was sensible of the true cause, and confessed and sincerely regretted her own carelessness.

Many marvellous stories and descriptions of hideous and obstinate eruptions, and other dangerous diseases, said to have been caused by vaccine inoculation, or, in the words of the authors of these ridiculous reports, "by the introduction of bestial humours into the human constitution," have been fabricated and industriously circulated by interested and designing men, tending to shake our faith in the antivariolous power of the cowpox, and to prejudice the minds of the people against this mild preventive of smallpox; that these, however, have no foundation in truth may be collected from the following testimonials. Dr Willan of London, a gentleman who is well known to have made cutaneous diseases the particular subject of his most minute investigation for many years past, and who has deservedly acquired much fame for his accurate observations in this field of medical research, informs us, that he has "carefully examined, with different physicians and surgeons, various cases of cutaneous eruptions attributed to vaccination. Instead of the mange or any eruption communicable from quadrupeds to the human skin, we have constantly found diseases which were known and have been fully described by medical writers more than a thousand years ago." And as a proof that the cutaneous diseases formerly known have

not become more general in consequence of vaccination, he has favoured us with a table extracted by Dr Bateman from the register of patients at the public Dispensary in London, from which it appears that the proportion of cutaneous to other diseases was rather greater before the publication of Dr Jenner's discovery than in the sixth and seventh year of vaccination. And nearly the same proportion, Dr Willan informs us, may be deduced on comparing Dr Murray's, Dr Reid's, Dr Walker's, and his own reports on the diseases in London during the last ten years. Dr Willan also gives it as his decided opinion, that the vaccine inoculation is much less liable to excite inflammation and suppuration of the glands than either the natural or the inoculated smallpox*.

This ample testimony afforded by examining the registers of the Dispensaries, &c. established in that very city from whence have been propagated so many reports prejudicial to vaccination, must be held by every unbiassed mind as decisive of this important question concerning eruptions caused by vaccination. How far the above opinions accord with the observations of medical men in other cities may be collected from the following evidence: Mr Trye, senior, surgeon to the infirmary at Gloucester, the very county in England in which the cowpox was first noticed, and in which it is perhaps more prevalent than in any other, informs us :

1st, "That a more healthy description of human beings does not exist, nor one more free from chronic cutaneous impurities than that which suffers most from cowpox, by reason of their being employed in dairies." And,

* Vide Willan on Vaccination, page 81, et seq.

2d, "That the Gloucester Infirmary, one of the largest
" provincial hospitals, is situated in a county in which ac-
" cidental cowpox has been prevalent from time immemorial.
" Many hundreds among the labouring poor have had that
" cowpox since the establishment of this institution, and that
" *more severely than is generally the case in artificial vaccina-*
" *tion, and yet not a single patient, in half a century, has ap-*
" *plied to the infirmary for the relief of any disease, local or*
" *constitutional, which he or she imputed or pretended to trace*
" *to cowpox.* And be it repeated and remembered, that the
" *artificial* in no respect differs from the *accidental* cowpox,
" except in being generally less virulent *."

In the Report of the surgeons of the vaccine institution at the public Dispensary of Edinburgh for 1805, it is stated, that, "In consequence of some recent publications against
" vaccination, particularly asserting that it operates as a pre-
" ventive of smallpox only for four years, and that it pro-
" duces new and dangerous diseases, the surgeons have lately
" examined personally a great number of those children who
" were inoculated at this institution in the beginning of the
" year 1801, and have found that many of them have within
" these three months been freely exposed to the contagion of the
" natural smallpox, in several quarters of the city where this
" loathsome disease has unfortunately been very prevalent,
" without having been infected; *and they beg particularly*
" *to notice, that they have not found one single instance in*
" *which obstinate eruptions, or any new and dangerous disease*
" *has been produced, in consequence of the introduction among*
" *mankind of this mild preventive of the smallpox.*" And this statement is further confirmed by the whole members of the Royal College of Surgeons of Edinburgh in their Report to the College of Physicians of London, on the subject of vac-

* Vid. Medical and Physical Journal, vol. xv. page 303.

cination, bearing date the 3d of March 1807, seven years after the vaccine inoculation had been introduced, and had been commonly practised amongst all ranks of the inhabitants of that city. In this report it is said, "The members of the Royal College have met with no occurrence in their practice of cowpox inoculation which could operate in their minds to its disadvantage; and they beg leave particularly to notice, that they have seen no instance of obstinate eruptions, or of new and dangerous diseases, which they could attribute to the introduction among mankind of this mild preventive of the smallpox *."

In consequence of a message from the House of Commons, his Majesty was pleased to command that the Royal College of Physicians of London should inquire into the state of vaccine inoculation in the United Kingdom, and report their opinion and observations on that practice, upon the evidence which has been adduced in its support, and upon the causes which have hitherto retarded its general adoption.

The Royal College did accordingly, after a full and impartial investigation of the subject, make a report highly favourable to the practice of vaccination. On the particular point now under consideration, the College thus express themselves. "The testimonies before the College of Physicians are very decided in declaring that vaccination does less mischief to the constitution, and less frequently gives rise to other diseases, than the smallpox either natural or inoculated."

"The College feel themselves called upon to state this strongly, because it has been objected to vaccination, that

* Vid. Report of the College of Physicians of London on Vaccination, Appendix, p. 12.

“ it produces new, unheard of, and monstrous diseases. Of
“ *such assertions no proofs have been produced, and after dili-*
“ *gent inquiry, the College believe them to have been either the*
“ *inventions of designing, or the mistakes of ignorant men*.*”
“ Representations of some of these (diseases) have been exhi-
“ bited in prints in a way to alarm the feelings of parents,
“ and to infuse dread and apprehension into the minds of the
“ uninformed. Publications with such representations have
“ been widely circulated; and though they originate either in
“ gross ignorance, or wilful misrepresentation, yet have they
“ lessened the confidence of many, particularly of the lower
“ classes, in vaccination; no permanent effects, however, in
“ retarding the progress of vaccination need be apprehended
“ from such causes, for as soon as the public shall view them
“ coolly, and without surprize, they will excite contempt and
“ not fear†.” May this opinion soon be verified.

* Vide Report, p. 4.

† Vide *ut supra*, p. 6.

NO. IV.

See page 79

SINCE the publication of the first edition of these observations in 1802, much controversy has taken place amongst medical men concerning the efficacy of vaccination to prevent the future attacks of smallpox on the human constitution. Instances in which this new inoculation has been supposed to fail in giving the desired security have been diligently sought after ; and, without having undergone that calm investigation which should always attend the search after truth, have been blazoned forth to the world in publications, written apparently with very different motives than that of elucidating an important point in the science of medicine, upon which the happiness or misery of millions of our fellow-creatures was to depend. For an ample detail of all the circumstances attending this vaccine controversy, and for a clear and impartial summing up of the evidence on both sides of the question, I must beg leave to refer my reader to the Edinburgh Review for October 1806, Art. iii.

In consequence, however, of the many idle and ridiculous stories which still continued to be circulated, tending to

shake the faith of the public in the advantages to be derived from vaccination, this new inoculation began to be viewed with a jealous eye in many places, and particularly in London, and the neighbourhood, where it has been for eighteen months past nearly at a stand, and where the smallpox has again spread its desolating contagion with almost unexampled fury, insomuch, that public institutions have there again been opened for the inoculation of the smallpox, and the interference of parliament has again been thought necessary.

In consequence of a message from the House of Commons, his Majesty was pleased to command that the Royal College of Physicians of London should enquire into the state of vaccination in the united kingdom, and report their opinion and observations on that practice, upon the evidence which has been adduced in its support, and upon the causes which have hitherto delayed its general adoption.

The Royal College did accordingly, after a full and impartial investigation of the subject, make a report highly favourable to vaccination, in which they conclude: "From the whole of the above considerations, the College of Physicians feel it their duty strongly to recommend the practice of vaccination. They have been led to this conclusion by no preconceived opinion, but by the most unbiassed judgment, formed from an irresistible weight of evidence which has been laid before them. For, when the number, the respectability, the disinterestedness, and the extensive experience of its advocates, is compared with the feeble and imperfect testimonies of its few opposers; and when it is considered that many, who were once adverse to vaccination, have been convinced by further trials, and are now to be ranked among its warmest supporters, the truth seems to be established as firmly as the nature of such a question admits; so that the College of Physicians conceive that the

“ public may reasonably look forward with some degree of
“ hope to the time when all opposition shall cease, and the
“ general concurrence of mankind shall at length be able to
“ put an end to the ravages at least, if not to the existence
“ of the smallpox *.”

In consequence of this report, so very favourable to the practice of vaccination, the British parliament, as a token of the sense of a grateful people to their benefactor, and in some degree to express their estimation of one of the most valuable discoveries that ever appeared in the world, voted to Dr Jenner, the author of this discovery, L.20,000 in addition to L.10,000 formerly granted him with the same liberal intention †.

To enable us still farther to form an opinion concerning the efficacy of the cowpox, as a sure preventive of the smallpox, let us next take a short view of the progress of vaccination in situations in which it has been less fettered by opposition than it has been in the bosom of its own country ; and from thence let us judge whether it merits the encomiums conferred on it by the Royal College of Physicians, and acquiesced in by the British Parliament as above mentioned.

In the year 1800, Dr Woodville went to Paris, and first introduced the practice of vaccination into France. In that country, as well as in this, the practice at first met with opposition ; in 1802, however, the annual report of the central committee of vaccination declared its success ; and the report of the same committee in 1804 shows that the practice of

* Vid. Report of the College of Physicians of London on Vaccination.

† See Proceedings in the House of Commons, 29th July 1807.

vaccination in France was then fully established. The business of vaccination in France appears at an early period to have been taken under the protection of the state, and all the energies of the French government were called forth to render the practice general and effectual.

The minister of the Interior instituted a society for the extermination of the smallpox, by rendering vaccination general, of which he is himself the president, as appears by the following decree.

“ The minister of the Interior considering, that the advantages of vaccination have been sufficiently ascertained by
“ the numerous experiments made or collected by the central
“ committee established at Paris, and by the National Institute ; that this method, already practised with success in
“ almost every part of France, only requires a uniform and
“ regular mode of propagation, in order to obtain every degree of extension of which it is susceptible, has issued the
“ following decree : There shall be at Paris, near the minister of the Interior, a central society of vaccination, of which
“ the minister shall be president *,” &c. He then addressed circular letters to the prefects of the different departments, inviting them to promote, by all the means in their power, vaccine inoculation : “ The immense advantages of which,
“ for the increase of population, and the welfare of mankind,
“ are so completely demonstrated.” Committees of vaccination, composed of the most intelligent medical practitioners, were consequently established by the prefects in every department, and a regular and frequent correspondence is maintained between these and the central society of vaccination.

* See Med. and Phys. Journal, vol. xiii. page 424.

From the communications received from the vaccine committees of the different departments, an annual report is made by this society upon the labours undertaken in France for the propagation of vaccination. From the report of this society, made on the 12th June 1806, it appears that vaccination at that time not only maintained its character in that country, but that it was daily becoming more popular and more anxiously sought after by all ranks of the people. "Après six ans d'expérience en France, il reste toujours constant que cette précieuse méthode, bien employée, n'a rien de nuisible ni de dangereux : et que la vraie vaccine préserve de la petite vérole, et qu'en outre elle est encore utile dans plusieurs cas d'infirmités et de maladies."

From this report, it appears that nearly 400,000 persons were vaccinated in the year 13, in the French dominions; of these many have been exposed to the contagion of the smallpox by inoculation, and others by an intimate communication with persons labouring under that disease, even under the form of a severe epidemic, yet they have uniformly resisted its influence.

It appears also, by this report, to be fully established, that in those departments of France in which vaccination is generally practised, the smallpox is much less frequent than formerly; in some altogether exterminated; and that there is also in them a very manifest decrease in the bills of mortality. Vide Séance général de la société centrale, établié pour l'extinction de la petite verole en France, par la propagation de la vaccine. Tenue, le 12 Juin 1806.

In Spain the knowledge of vaccination was received with avidity, and the practice has, in that country, been followed with the happiest success. Vaccination also appears to have been taken under the protection of the government in Spain at an early period; and in such estimation was

it held in that kingdom, “that in all the royal ordonnances “relative to that subject, its worthy author was styled the “Immortal Jenner.” Vide Debates in Parliament respecting the Jennerian discovery, p. 52.

It appears also, that the Spanish government, sensible (from experience) of the great advantages resulting from vaccine inoculation, did fit out, at considerable expence, an expedition for the sole purpose of carrying this inestimable gift to all the possessions of the crown of Spain beyond the seas. Dr Francis Xavier Balmis surgeon extraordinary to the king, who had the charge of this expedition, sailed from Corunna in November 1803; and after introducing the practice of the vaccine inoculation into all the Spanish possessions on the western continent, into the Visayan and Philippine Islands, and also into several other nations, returned to Spain in September 1806. The particulars of this very interesting expedition are published in the Supplement to the Madrid Gazette of 14th October 1806. See some account of it in the Debates in Parliament, *u. s.* p. 121.

From the great trouble and expence necessarily attending an expedition of this kind, we may in some measure judge of the degree of estimation in which this new inoculation was held by the inhabitants of that country, by which such an expedition was fitted out: and that the sanguine hopes they entertained, with regard to the great advantages to be derived from it, will not be disappointed, we have the satisfaction of knowing from the following article in the Frankfort Journal for February 1806. “The reports of several committees of “vaccination established in Spain, as well as in the New “World, reports which are all accompanied with attestations “delivered by the civil and judicial authorities, unanimously confirm the happy result of this salutary practice. The natural smallpox, which almost every year.

“ desolated Mexico and Peru, has lost its malignity in those
“ climates, to such a degree, that the number of children
“ who fall victims to that scourge, is reduced in the propor-
“ tion of nine to one.”

By an examination of the bills of mortality in Vienna for ten years, viz. from 1791 to the 31st December 1800, the average number of deaths in that city was 14,600 annually; of which number 835 were from the smallpox. In 1801, after the vaccine inoculation was introduced into that capital, only 164 persons died from smallpox. In 1802, the number of deaths from this cause was only 61. In the year 1803, only 27; and in 1804, out of 14,000 deaths, only two were from the smallpox*; and since that time, Dr De Carro, an eminent physician in that city, writes, “ That the smallpox is utterly unknown among the people
“ in Vienna, and is there considered as being completely
“ exterminated.” Med. and Phys. Journal, No. 81. p. 409.

In the Madras Government Gazette, dated December 19th 1804, it is mentioned that by the last returns 216,000 persons had been vaccinated in that settlement; and 26,000 in Ceylon; and so much were all ranks of the people satisfied with the great advantages resulting from this new inoculation, that it was proposed to establish fixed and permanent institutions, so that every village might have the advantage of vaccine inoculation within itself.

In the East Indies some millions of persons have been vaccinated. “ In Bombay such has been the success of
“ vaccination, that the smallpox is totally extirpated;”
and “ at Ceylon that disease has been so far subdued, that
“ the hospital formerly appropriated to receive persons in-
“ fected with the smallpox, is now given up for the use of

* Vid. Séance général de la Société central, &c. p. 66.

“ the army.” “ In Swedish Pomerania the mortality from
“ smallpox has been diminished, in the proportion of fourteen
“ to one, from 700 yearly, to less than 50.”—“ These facts are
“ stated on the best authorities.” Vide Debates in Parlia-
ment, *u. s.* page 125.

I am informed by Dr Dinwiddie, who left India about the
beginning of the year 1807, a gentleman of much general
science, and an intimate acquaintance of the superintendant
general of vaccination in Bengal, that inoculation for the
cowpox has become very general in that country, and is at-
tended with every possible success; and that failures in giv-
ing security against the smallpox by vaccination are there
totally unknown.

When the Russian Court was at Moscow in 1801, the vac-
cine inoculation was first practised there on a child, who was
afterwards called *Vaccineff*; since which time, it has been
generally practised and established throughout the Russian
empire; and as a mark of the estimation in which that prac-
tise is held throughout that extensive empire, the University
of Wilna in November 1804, after three years experience of
the new inoculation, did confer on Dr Jenner an honorary
diploma in testimony of their opinion with regard to vac-
cination, and of the advantages which may be derived to
society from his invaluable discovery. See *Med. and*
Phys. Journal, vol. xiii. page 428.

In the summer of 1802, the vaccine inoculation was first
employed at Copenhagen; and soon became so general, that
in the succeeding years, the bills of mortality for that city
returned none as dying of the smallpox. *U. s.* vol. xviii.
page 28.

I am told by Dr Stedman physician on the island of St
Croix, in the West Indies, that such has been the success of

vaccination in the Danish dominions, that inoculation for the smallpox has been prohibited by a proclamation of the Danish government, not only in Europe, but also in the West India Islands. In St Croix, where vaccination goes on with great success, this prohibition was proclaimed about three years ago. Dr Stedman also informs me that the smallpox, even by inoculation, was often extremely fatal in St Croix; and that vaccination is there esteemed as one of the greatest blessings.

Sir George Staunton having translated into the Chinese language a treatise on the vaccine inoculation, which was drawn up by Mr Pearson surgeon to the English Factory in China, a general inoculation for the cowpox had in consequence taken place in the populous city of Canton; and so far have this jealous people got the better of their prejudices, in this instance, and so confident are they become of the efficacy of vaccination as a preventive of the smallpox, that a very large subscription has been raised for establishing an institution in the city of Canton; by means of which the inoculation is to be spread into the neighbouring country, and the disease disseminated into every province of that vast and populous empire*.

It is not meant to deny that many instances have occurred in which persons have been attacked with the smallpox after they had been inoculated with the cowpox, and after they had, in the opinion of the persons who conducted the inoculation, undergone the antivariolous process in a regular and effectual manner. But I wish it also to be remembered, that for some years after the discovery of this new inoculation, many surgeons undertook this practice without having studied, or in any way having made themselves

* Vid. *u. s.* vol. xvi. page 96.

acquainted with the symptoms and regular progress of the affection ; and that, in a vast number of instances, persons not of the medical profession, and very ignorant concerning the nature of the disease, took upon themselves to inoculate for the cowpox. What wonder then, if, under such circumstances, failures should then, and even now amongst persons who were at that time inoculated, frequently occur? Besides it very frequently happens in public institutions for the gratuitous inoculation of the cowpox, and in private also, when the operation is gratuitously performed, that, from the carelessness of parents, &c. in not returning with their children for examination, the progress of the affection is in many cases wholly unknown to the inoculator. The process may have been complete; but it may also have entirely failed; and the patient may afterwards be attacked by the smallpox. The cowpox will thus be very unjustly blamed for having failed to give the promised protection; and the parents, willing to screen themselves from the imputation of neglect, join in discrediting the efficacy of the new inoculation; and, though, well knowing where the fault lies, tacitly acquiesce in whatever is said to its prejudice. The instances in which my colleagues, at the institution for the gratuitous inoculation of the cowpox here, and myself, have experienced the truth of the above statement, as giving rise to erroneous reports respecting vaccination, are very numerous; many of these reports have cost us much time and trouble to investigate; but we have generally succeeded in expiscating the facts, so as to give us satisfaction, by removing all blame from vaccination.

Again, although it be freely admitted that many instances have occurred, in which persons have suffered an attack from the smallpox after they had been inoculated for the cowpox, and even after they had, in the opinion of the persons who conducted the inoculation, undergone the antivariolous process in a regular and effectual manner; yet it must, at the

same time, be kept in remembrance, that there are many instances on record, in which persons have at one time resisted the constitutional action of the smallpox, though freely exposed to the infection of that disease, both by effluvia and by inoculation, and have at another subsequent time suffered from it very severely; and also, that there are many instances on record, in which persons have been affected with the smallpox in a very severe manner, although they had at a former period actually been infected, and passed through all the stages of that disease; and these second attacks of smallpox have taken place after the casual disease, as well as after it had been communicated by inoculation. But why this susceptibility of a second attack from the smallpox should exist in some constitutions and not in all is a question, for the solution of which physicians have not yet even hazarded a conjecture; that the fact, however, is so, appears from many well authenticated instances, recorded in the Annals of Medicine, long before the discovery of vaccine inoculation. At page 63, note, I have referred to several cases of smallpox, which had occurred a second time in the same person; I shall here beg leave to state some instances in detail.—Dr Plowden of Arundel gives the following:

“ In the year 1738, the smallpox committed its furious ravages in this place, and is said to have destroyed one out of every seven whom it attacked. Amongst the numbers infected was William Birt, at that time about 18 months old. He recovered; and for the rest of his days, was a living monument of the havoc the disorder had made; I knew him well, and do not recollect many instances of a person more fretted and seamed by the smallpox than he was.

“ The marks he bore were deemed a sufficient security against any future infection of the smallpox. He was therefore appointed to attend on variolous patients in the pest-house; a kind of lazeretto at the skirts of the town.

“ One woman died of the smallpox in the house on the
“ 15th February 1799, and another a few days after. Wil-
“ liam Birt, the subject of your inquiries, sickened on the 28th
“ of the same month, and the eruption appeared on the 4th
“ day. I saw him on the 6th day of the disease, being sent
“ for by the family to give my opinion on the possibility of
“ its being the smallpox ; which none of them could believe
“ from the evident marks of his having had the complaint.

“ On inquiry, I found that he had been exposed a short
“ time before to variolous contagion, and that his disorder
“ commenced with the symptoms usually attending the worst
“ kind of smallpox. The eruption was confluent, and his
“ throat was severely affected. He was removed from his
“ house on the day that I visited him to the pest-house,
“ where he died on the 12th day of the disease, &c. (Signed)
“ WILLIAM FLOWDEN.” See Medical and Physical Journal,
vol. xiv. page 404.

The following instance ought to be deemed perfectly satis-
factory on this point. “ The child of Mr King, No. 3.
“ Printers Street, Blackfriars, was inoculated for the small-
“ pox at the Smallpox Hospital in March 1798. A pustule
“ rose ; the patient sickened at the usual time, and was very ill
“ three days ; after which an eruption took place, consisting
“ of ten very large pustules, scattered over different parts.

“ Mrs King went to the hospital three times a-week for the
“ space of three weeks, and had several doses of physic for
“ the child. On the last day of her attendance, she was as-
“ sured by Mr Waschel, resident surgeon at the hospital, that
“ the child was safe, and she need not attend any more. Mr
“ King confirms this statement in all the essential particu-
“ lars.

“ The day after they last attended at the hospital, the child
“ again sickened, and had a violent vomiting. Two days
“ afterwards a very considerable eruption took place, which
“ the neighbours supposed to be the measles. A few days
“ afterwards, Mr Ridout was desired to attend the child;
“ and being informed that she had been inoculated at the
“ smallpox hospital, thought it necessary to send for Dr
“ Woodville. Dr Woodville saw her in the course of the
“ day. He told Mr Ridout, it was a case of smallpox a se-
“ cond time; and the second instance he had seen in which
“ there could be no doubt of the fact. On the next day,
“ Dr Woodville informed Mr Ridout, he had consulted the
“ register, and found that this child and fourteen others were
“ inoculated from a man in the hospital who had the natural
“ smallpox, and that all of them except one had taken the
“ disease.” This child had the disease in a very severe man-
ner, and was attended by Mr Ridout, Dr Woodville, and Mr
Waschel, during nearly three weeks; and all these gentlemen
were satisfied that their patient had twice undergone the dis-
ease of smallpox. (See Med. and Phys. Journal, vol. xiv.
page 406.

Copy of a letter from the Earl of Westmeath to Dr Jen-
ner, dated May 23. 1805.

“ Sir,—Understanding that a report has been circulated,
“ which, if believed, would tend much to weaken that con-
“ fidence which is at present so generally and so justly en-
“ tertained by the public in your system of inoculation for
“ the cowpox, namely, that my youngest son had taken the
“ smallpox after having been vaccinated; I think it but jus-
“ tice to you to contradict the report, and to state for your
“ satisfaction the real circumstances of the case, which are
“ as follow :

“ When he was about two months old he was inoculated
“ for the smallpox, in the Suttonian method, by a physician
“ in Ireland, who has been generally successful in inocula-
“ tion, and pronounced by him to be perfectly free from the
“ risk of infection; notwithstanding of which he caught the
“ infection about a fortnight since, and is now recovering
“ from the natural smallpox. I beg to inform you at the
“ same time, that my youngest daughter, who was vacci-
“ nated by you about four years since, has not only been
“ frequently exposed to the danger of infection, but was ac-
“ tually inoculated for the smallpox without taking it. I
“ have considered it incumbent on me to bear testimony to
“ the efficacy of the vaccine system, as I consider the re-
“ port relative to my son, which originated in misrepresen-
“ tation, to have been circulated for purposes obviously
“ prejudicial to that most useful and fortunate discovery.
“ I request you will make any use of this communication
“ which you may think necessary. I am, Sir,

“ Your obedient humble servant,

“ WESTMEATH.”

See Med. and Phys. Journal, vol. xiv. page 256.

Mr Thomas Wainwright at Duddley makes the following communication: “ A child of Mr Downing, then resident at
“ Stourbridge, was inoculated in the spring of 1804, by an
“ eminent surgeon of that place, for the smallpox, which
“ the child had in a very favourable way. In May 1805,
“ this child caught the smallpox and died. In the second
“ and fatal attack of the smallpox, the attendance of the
“ surgeon who inoculated the child in 1804 was required.
“ He well recollected every circumstance that attended the
“ inoculation of the child, and declares that the smallpox,
“ in consequence of the inoculation, was perfectly regular,
“ and such as he should in all cases have relied upon with

"implicit confidence." Med. and Phys. Journal, vol. xiv. p. 436.

The child of Dr Croft was inoculated by Dr Steigerthal, physician to King George I. He had the smallpox of the confluent kind in consequence of this inoculation, and yet had it again *very full* in the natural way twelve months after. This, says Dr Woodville, in his history of inoculation, p. 217. is a striking fact which has never been contraverted.

That the fact of persons who have had the smallpox being again attacked with the same disease, is not one that has only been lately noticed, appears from the writings of Jo. Baptista Burserius, *de morbis exanthematis febrilibus, &c.* in 1785, in which we are informed, that "They entertain an erroneous opinion who think that, after once having the genuine smallpox, the disposition of the body to receive that disorder is destroyed; for it appears from undoubted facts, and from the investigations of medical men of unquestionable authority, that not a few persons, after experiencing the complaint in the natural way or by inoculation, have afterwards been affected a second and even a third time." Vide Chap. III.

From the above evidence, no unprejudiced mind can hesitate to declare, that although it has been generally received as a true proposition, that persons who have once had the smallpox are thereby secure against all future attacks from that disease, yet that exceptions to that rule are clearly and distinctly marked. That these exceptions are more numerous than have generally been imagined, appears not only from the above passage in Burserius, but also from consulting the writings and observations of other respectable men. There are now before me nearly one hundred cases on record, in which the human constitution has suffered more or

less severely from a second attack of smallpox ;—in many of these the attack has proved fatal. Whoever wishes to examine more instances of this sort, may consult Mr Ring's Treatise on the Cowpox ; Mr Ring's Answer to Dr Moseley ; Moore's Reply to the Antevaccinists ; and also the 13th, 14th, and 15th vols. of the Med. and Phys. Journal.

When we thus find so many well authenticated instances of a second attack from the smallpox, we should be less surprised if we occasionally meet with instances in which that disease has succeeded to the cowpox ; and notwithstanding of the failures in vaccination which have hitherto been reported on any tolerable authority, we ought in justice to make the same conclusion with regard to vaccination, as has always been made with regard to the smallpox, namely, that persons who have undergone the full effect of inoculation with the cowpox may be considered as being secure against the attacks of the smallpox.

According to the report of the Royal College of Surgeons of London, which was made to the Royal College of Physicians of that place, it appears that of 164,381 persons vaccinated by members of that body, 56 were afterwards affected with the smallpox ; that is about one in three thousand ; a proportion certainly extremely small, when all circumstances are considered, and a number which, even allowing the proportion of failures to continue the same, would still render the practice of vaccination invaluable to society. For if we allow that 40,000 persons die annually from the smallpox in Great Britain and Ireland, and that this is one in 14 of all that are born in these countries, then $40,000 \times 14$ gives 560,000 persons born, or that may be vaccinated yearly in the united empire ; and if one in 3000 be still left liable to the smallpox after vaccination, 187 only will remain unprotected ; of which number, allow that one in 14

shall die from the smallpox *, then will 13 persons only suffer annually in Great Britain and Ireland, from the smallpox in place of *forty thousand*.

But as there can be no doubt that several of the above mentioned failures may be fairly attributed to the inexperience of inoculators, it may with reason be expected that farther observation and investigation of the laws by which the action of the vaccine contagion in the human constitution is governed, will yet lead to improvements in the practice, and furnish the means of determining with still greater precision when the inoculation has been complete. On the other hand, however, it must be remembered, that, in order to obtain such immunity, or diminished mortality from the smallpox throughout the British empire, as has been stated above, it will be necessary that the practice of vaccination be taken out of the hands of the ignorant and inexperienced, and be generally confined to persons equally well qualified to conduct it as those members of the Royal College of Surgeons of London, from the result of whose practice the above proportions have been taken; and I shall, in a future part of these observations, endeavour to point out how this may be best accomplished.

* This is thought a large allowance when it is considered that the smallpox, succeeding to vaccination, is generally greatly milder than when the person has not been vaccinated; (See Report of College of Physicians,) and also, that from the rareness of smallpox, the whole of that number can scarcely be supposed to be exposed to its baneful contagion.

No. V.

Supra 85

THE following outlines of a plan for extinguishing the contagion of the smallpox in the British empire, by rendering the vaccine inoculation general and effectual, was transmitted to his Majesty's ministers on the 2d June 1808, for their consideration. I insert it here for the purpose of obtaining farther observations on the practicability and propriety of putting it in force, and on the probability of its efficacy in accomplishing the object in view. It may be proper to premise, that I have submitted it to the examination of many respectable clergymen of various persuasions, who have uniformly approved of it, and cheerfully offered every assistance in their power towards carrying it into effect. It has also been submitted to the examination of men learned in the laws of our country, and to others high in the medical profession, and from them also it has met with approbation. Still, however, certain regulations, better adapted, perhaps, to local circumstances, may be devised, whereby the whole might be rendered more complete; and as I am more and more convinced that some regular plan must ultimately be

had recourse to, in order to secure to society all the advantages which are to be derived from vaccination, I shall be grateful for such observations as may appear to be calculated for the improvement of that which I am now to propose.—

Outlines of a Plan for Extinguishing the Contagion of the Smallpox in the British Empire, by rendering the Vaccine Inoculation General and Effectual.

Many centuries have now elapsed since the smallpox became a principal source of destruction to the human race throughout every quarter of the known world. In some countries it has appeared only at uncertain intervals, spreading its desolating contagion with such rapidity as to exterminate whole tribes of people; while in others it has become as it were domesticated, following a more gradual though scarcely less certain course of destruction. On a fair and unexaggerated statement, three thousand lives in London, and in its immediate vicinity, and forty thousand in the united kingdom, are annually the direct victims of the smallpox, besides a great mortality which is occasioned by disorders consequent upon this disease. It is also estimated that in London alone, of those persons who survive the ravages of the natural smallpox, six thousand are afflicted either with blindness, deformity, or loathsome diseases, which render them miserable for life.

The inoculation for the smallpox, which was introduced into these realms nearly an hundred years ago, was deservedly reckoned one of the greatest discoveries of the healing art; as by this operation, if universally practised, the mortality from that disease might be greatly diminished. That this discovery, however, has not been attended with the expected benefit to the community at large, appears from this esta-

blished fact, that the bills of mortality show a greater proportion of deaths from the smallpox, during forty-two years since the practice of inoculation has been prevalent, and notwithstanding the improved mode of treatment of the natural smallpox itself, than for a like number of years previous to that discovery; the general average giving 72 in every thousand before the introduction of inoculation, and 89 in every thousand since that period.

Dr Jenner's invention of inoculating with the cowpox, as a safe and effectual preservative against this most cruel and destructive enemy of the human race, was therefore hailed, by the well-wishers of mankind, as a noble and a blessed discovery. The knowledge and the practice of vaccination soon became far more general than ever inoculation for the smallpox had been, and its efficacy was almost universally acknowledged—by the parliament of the British empire, in voting a remuneration to the discoverer—by many states on the continent of Europe, in prohibiting inoculation for the smallpox, and enforcing vaccination throughout their dominions; and, generally, by official reports from almost every country in the civilized world.

Under these circumstances, it certainly was reasonable to expect that this new species of inoculation should quickly become so general as entirely to supersede and exterminate the smallpox. In this, however, our hopes have been wonderfully disappointed, the smallpox having again for upwards of twelve months raged with almost unexampled fury in the metropolis of that very country in which the preventive of this disease was discovered. In the course of four weeks, in the 8th year of the Jennerian discovery (Dec. 1807) no less than 290 persons were destroyed by the smallpox, within the bills of mortality of the city of London, and vaccination had for twelve months been nearly at a stand; in so much that the interference of the legislature was again thought neces-

sary. In consequence of a message from the House of Commons, his Majesty was pleased to command that the Royal College of Physicians of London should enquire into the state of vaccine inoculation in the united kingdom, and report their opinion and observations on that practice, upon the evidence which has been adduced in its support, and upon the causes which have hitherto delayed its general adoption. The Royal College did accordingly, after a full and impartial investigation of the subject, make a report highly favourable to the practice of vaccination, in which they conclude, "From
" the whole of the above considerations, the College of Physicians feel it their duty strongly to recommend the practice
" of vaccination. They have been led to this conclusion by
" no preconceived opinion, but by the most unbiassed judgment, formed from an irresistible weight of evidence which
" has been laid before them. For when the number, the respectability, the disinterestedness, and the extensive experience of its advocates, is compared with the feeble and imperfect testimonies of its few opposers; and when it is considered that many, who were once adverse to vaccination, have been convinced by further trials, and are now to be ranked among its warmest supporters, the truth seems to be established as firmly as the nature of such a question admits; so that the College of Physicians conceive that the public may reasonably look forward with some degree of hope to the time when all opposition shall cease, and the general concurrence of mankind shall at length be able to put an end to the ravages at least, if not to the existence of the smallpox." See Report of the Royal College of Physicians of London on Vaccination, ordered to be printed by the House of Commons, 8th July 1807.

In considering the causes which have hitherto delayed the general adoption of vaccine inoculation, the Royal College, after stating the malignant and contemptible efforts of authors, and interested men, who have attempted to abuse

the ignorance and excite the prejudices of the lower orders of society against vaccination, add, "Though the College of Physicians are of opinion that the progress of vaccination has been retarded in a few places by the above causes, yet they conceive that its general adoption has been prevented by causes far more powerful, and of a nature wholly different. The lower orders of society can hardly be induced to adopt precautions against evils which may be at a distance; nor can it be expected from them, if these precautions are attended with expence. Unless, therefore, from the immediate dread of epidemic smallpox, neither vaccination nor inoculation appear at any time to have been general, and when the cause of terror has passed by, the public have relapsed again into a state of indifference and apathy, and the salutary practice has come to a stand. *It is not easy to suggest a remedy for an evil so deeply imprinted in human nature.* To inform and instruct the public mind may do much; and it will probably be found that the progress of vaccination in different parts of the United Kingdom will be in proportion to that instruction. Were encouragement given to vaccination, by offering it to the poorer classes without expence, there is little doubt but it would in time supersede the inoculation for the smallpox, and thereby various sources of variolous infection would be cut off; but till vaccination becomes general, it will be impossible to prevent the constant recurrence of the natural smallpox by means of those who are inoculated, except it should appear proper to the legislature to adopt, in its wisdom, some measure by which those who still, from terror or prejudice, prefer the smallpox to the vaccine disease, may, in thus consulting the gratification of their own feelings, be prevented from doing mischief to their neighbours."

To these causes, which have impeded the general adoption of vaccination, may be added another, which, the more

it is investigated, the more it will be found to obstruct the general practice of this new inoculation. From the circumstance of inoculation for the cowpox being in itself a very simple operation, and from little or no sickness attending the progress of the affection, vaccination has been too much practised by persons totally unacquainted with the laws by which the action of the vaccine contagion on the human constitution is regulated. Thus, the operation has been performed; and when nothing but a slight inflammation has been produced, this has been mistaken for the proper vaccine affection; or the vaccine inoculation has, by the presence of other diseases lurking in the constitution, been rendered merely a local affection; or it may have been, from the same causes, altogether prevented from taking place at the time; and these inoculators have, through ignorance, declared such persons to be sufficiently protected against the smallpox, or insusceptible of the cowpox. The consequences have proved such as might be expected, viz. too often fatal to the deluded patient, and highly detrimental to the interests of vaccination. Had vaccine inoculation been confined to Dr Jenner, and to other gentlemen who had directed their particular attention to the subject, and pursued it as one of the chief objects of their profession, as variolous inoculation was in the early part of its introduction into this country, to the Suttons, &c. we should not now have had to lament the many errors which have taken place regarding it, nor the many ridiculous stories which have been officiously circulated by interested individuals, to the prejudice of the discovery, and to the great detriment of the public.

Although the inoculated cowpox may indeed, *as a disease*, be regarded as trifling, and little deserving the attention of medical men in general, yet as a certain preventive of one of the most loathsome diseases which affect the human race, it is of much importance, and highly deserving of the most minute attention, from those who undertake to superintend

its progress. Until therefore there be generally understood and practised some means of obtaining an unequivocal mark of a constitutional affection, which does constantly occur during the course of the cowpox when effectual, and which may be as readily distinguished as the fever and eruption consequent to the inoculation of the smallpox, this new inoculation ought certainly to be performed by those alone, even of the medical profession, who are well acquainted with every appearance of the ailment.

In a treatise on the cowpox, published by me in 1802, I mentioned both of the above powerful causes as being likely to impede the general practice of vaccination; and proposed, for obviating the former cause, "that the inoculation for the cowpox should be taken under the consideration and direction of the legislative powers in every nation*," &c. And for the latter, (viz. to remove that degree of uncertainty which does frequently occur, concerning the actual presence of the antivariolous process in the constitution,) I stated, that "a test of the presence of a constitutional affection in cowpox," was obtained by a second inoculation during the progress of the primary affection †, which, if universally understood and practised, would certainly do away in a great measure, if not entirely, all risk of error; but, until this test be generally practised, it is clearly proper and necessary, for the benefit of all concerned, that vaccination should be confined to these only, even of the medical profession, who, by making it their particular study, and by pursuing it as one of the chief objects of their attention, will therefore be better qualified to conduct it, and be more interested in its success.

* *Vide* Practical Observations on the Cowpox, page 84.

† *Vid. et supra*, p. 173 *et seq.*

I am fully aware of the establishment of many societies throughout the British Empire, several of which consist of the most respectable noblemen and gentlemen in the kingdom, for the purpose of propagating and rendering general the blessings of vaccination. But when it is considered that these societies depend entirely on the exertions of a few individuals, and more particularly that they provide no remedies against the powerful obstacles above mentioned, as impeding the general adoption of vaccination, it must be acknowledged that they are unequal to the accomplishment of the object in view.

From a knowledge of these circumstances, I have been induced to make out the following plan, which, to be effectual, must be sanctioned by a public act of the legislature; and now humbly submit it to his Majesty's ministers for their consideration.

PLAN, &c.

THE following plan for rendering vaccine inoculation general and effectual throughout the British Empire, as a remedy against the pestilence of the smallpox, embraces three objects.

I. The devising of means whereby to induce all parents and guardians to have their children or wards, before a certain age, inoculated with the cowpox.

II. The devising of means whereby to obtain correct lists of the names of all persons who have not been vaccinated.

III. The devising of means whereby the inoculation may be the most advantageously and easily performed, and at the same time the progress of the affection in patients the most accurately observed amongst all ranks of mankind.

The *first* of these objects might be obtained by an act of the legislature, prohibiting, under severe penalties, the inoculation for the smallpox, and enforcing, under like penalties, the inoculation for the cowpox; as has indeed been done by several of the States on the Continent of Europe. Such measures, however, it is thought, would ill agree with that freedom which is the boast of the British Constitution, and especially as there can be no doubt but that, in this enlightened nation at least, the same end may be attained by more gentle means; such as,

1st, By the influence of persons whose opinions are universally respected, and the example of those in the higher ranks of society, whom the great body of the people regard as objects of imitation in the common affairs of life.

2dly, By depriving those who neglect or reject the measure proposed of all right to those charities which a generous public has every where instituted for the behoof of persons who, having so conducted themselves in society as to be deserving of support, may happen to require their aid. And,

3dly, By adopting certain regulations respecting persons who may be found infected with the smallpox.

The *second* of these objects will be readily obtained with the aid of the clergy. And,

The *third* object of the plan it is proposed to attain by the establishment of a corps of vaccinators, to be distributed in stations throughout the united empire.

PART I.

After the many convincing proofs of the efficacy of the constitutional affection of the cowpox, in preventing all influence from the contagion of the smallpox, which have been collected from all quarters of the known globe, and especially after so very favourable a report, founded on the most full and candid investigation of the subject, has been promulgated by a British Parliament in favour of vaccination, no enlightened and unprejudiced mind can for one moment hesitate to disseminate the knowledge, and recommend the practice of this invaluable discovery. The Almighty has suffered the knowledge of the constitutional affection of the cowpox, operating as a preventive of the smallpox, to be revealed; and it becomes the bounden duty of those to whom he has granted the knowledge of such a blessing, to explain and to recommend the value and the acceptance of the benefit to others. The advice of the clergy, more especially in a case of this kind, which many are disposed to consider as intimately connected with religion, is at all times regarded with respect, and in this country is generally followed with attention by the great bulk of the people. Much, therefore, may be expected from their countenance and assistance on the present occasion; and from their enlightened minds, and benevolent characters, it cannot be doubted that these aids will be cheerfully afforded in furtherance of the present plan, when the happiness and comfort of their fellow-creatures is the great object in view. The alacrity with which many of the clergy, of all persuasions, have already come forward and exerted their utmost endeavours to disseminate the knowledge and practice of vaccination, deserves the thanks of their country, and shows that their exertions only require to be directed in a proper channel in order to be eminently useful in so good a cause.

From the great advantages which have already been experienced, by those in the higher ranks from vaccination, there cannot be a doubt of this new inoculation being anxiously sought after, and carefully practised amongst them; and consequently that their example will serve to show to others the high estimation in which this discovery is held by those best qualified to appreciate its merits; and from the certain knowledge which they must possess of the advantages resulting to themselves individually, as well as to society in general, from extending the same blessing to persons in the lower ranks of life, we may safely reckon on their cheerful acquiescence in any rational plan, which has for its object the accomplishment of this desirable purpose.

Another means of accomplishing the first part of our plan, is, by depriving those who fail to have their children vaccinated before a certain age, of all right to those charities which a generous public has every where instituted for the behoof of those persons, who, having so conducted themselves in society as to be deserving of support, may happen to require their aid.

In every well regulated state, provision is made for the unfortunate, by the establishment of charities, poor rates, &c. But while the unfortunate may with confidence look up to such support in time of need, it is incumbent on them at all times so to conduct themselves in society as to merit this support. What claim would persons who despised all the laws by which society is governed have upon the benevolence of that society? Could its aid be in justice granted to the idle and disorderly equally as to those who had conducted themselves in strict conformity to its interest and regulations? Certainly not; and if not, why should it be granted to those who, by their obstinacy or neglect, continue to spread murderous diseases amongst their fellow-creatures? The justice of this measure is therefore evident; and pro-

vided the measure itself be properly enforced, it cannot be doubted that it will prove a powerful means of forwarding the plan proposed.

The last of the means proposed for accomplishing the first part of our plan, is, to adopt certain regulations respecting those persons who may be found infected with the small-pox.

There has lately been established by government, “ A
“ Board of Health to prepare and digest rules and regulations
“ for the most speedy and effectual mode of guarding against
“ the introduction and spreading of infection, and for purify-
“ ing any ship or house, in case any contagious disorder
“ shall manifest itself in any part of the united kingdom,
“ notwithstanding the precautions taken to guard against
“ the introduction thereof; and to communicate the same
“ to all magistrates, medical persons, and others, his Majes-
“ ty’s subjects, who may be desirous, and may apply to be
“ made acquainted with the same.”

A report has accordingly been very ably drawn up by this Board, and published by order of his Majesty’s Privy Council; and as the regulations contained in it are chiefly made with a view to prevent the introduction and spreading of the plague, or other contagious and mortal distempers, there is no reason to doubt that the same measures, if enforced and strictly adhered to, especially when aided by the general practise of vaccination, would soon be effectual in checking and extinguishing the contagion of the smallpox. It is therefore proposed, that, by an act of the legislature, the same rules and regulations should be adopted with respect to persons infected with the smallpox, as has been recommended by the Board of Health with respect to persons infected with other contagious and mortal diseases.

PART II.

The *second* part of our plan consists in devising means whereby to obtain correct lists of the names of all persons who have not been inoculated with the cowpox.

It is in the execution of this part of our plan that the exertions of the clergy will be particularly called for ; and which is proposed to be effected by adopting the following regulations.

1st, Clergymen of every persuasion, throughout the united empire, shall be enjoined to enter in a book, delivered to them, and kept by them for the purpose, the names of all children baptized by them, with the names of the parents, their profession, and usual place of residence.

2d, On the first week of April, and first week of September every year, two lists shall be made out from these books, of the names of the children, the names of their parents, their profession, and place of residence ; one of which lists shall be forwarded to the head vaccine station of the district, and another to the subordinate station at which the congregations are respectively to apply for the benefits of vaccination*.

3d, At two periods in the year, viz. on the first Sunday in May, and on the first Sunday in October, let all clergymen be enjoined to read out the names of the children baptized by

* N. B. The society of Quakers keep accurate registers of all births and names of their children, which are lodged with the clerks of their monthly meetings, and could be readily forwarded at the periods required.

them, according to the lists forwarded to the head vaccine and subordinate stations, immediately after divine service, and to exhort the parents to have them immediately inoculated with the cowpox, naming a place, a day, and an hour, previously determined on, as the most convenient, by the clergyman of the established church, and the professional gentlemen at the head vaccine station of the district, where inoculation will be performed *gratis* to all such as may apply for that purpose.

4th, The above exhortation to be repeated for the three succeeding Sundays, with notification that those who resist or neglect the measure proposed, shall forfeit all right, for themselves and for their children, to those charitable establishments which are every where instituted for the behoof of those who may chance to require their aid; and also, that, in the event of any of the children being infected with the smallpox, whether by inoculation or otherwise, they shall be immediately confined by proper officers to their own houses, or removed to other houses, and put under regulations similar to those respecting persons infected with the plague.

5th, In the months of July and November, or as soon after as the clergymen shall have received returns, from the professional gentlemen at the head vaccine station of their district, of those who have been inoculated, and of those who have not been inoculated, they shall again read out the list of names as before, declaring those who may have neglected or resisted the measure, to have actually forfeited all right, &c. as in Regulation 4th.

6th, If any clergyman shall baptize the child of parents who do not belong to his own parish or congregation, it will become his duty immediately to give notice of this, the name of the child, the names of the parents, their profession and usual place of residence, to the clergyman of the parish or

congregation to which they may belong, in order that their names may be entered in his register, and forwarded regularly to the head vaccine station, &c. as above mentioned.

7th, Should any children be in such a state of health as to render the operation of inoculation improper at the usual period of the general inoculation, the operation may be deferred for a time, at the discretion of the vaccinator, without prejudice to the claim of the parents or child on the charities as above mentioned.

8th, A book to be kept by each clergyman, according to a formula prescribed, in which he shall insert the names of the children, if any such there may be, who have not been inoculated, with the reason, if known, why they have not been vaccinated. If this has proceeded from a bad state of health, such name must be again inserted in the list preparing for next return to the head vaccine station of the district.

9th, Should any children die before the period of the general inoculation, it shall be the duty of the parents to make this circumstance known to the clergyman of the congregation to which they belong; the clergyman shall request of parents to do this at the times of reading out the names, and exhorting them as above mentioned in Regulation 3d. And they shall mark "Died on ——" opposite the name in the register kept by them, and forward a note of the same to the subordinate vaccine station, to be there also inserted opposite the name in the registers, and in the lists returned to the head stations, as a cause of non-vaccination.

10th, That it shall be made a clause in all charters of establishments for charitable or beneficent purposes, and under penalty of forfeiting such charter, on proof being led of the fact, that none shall be admitted to the benefits of such establishments, unless they have undergone inoculation with

the cowpox; and that petitioners requesting aid must in every case send a certificate along with their petition, either of their having complied, or being willing to comply with the regulations respecting vaccination.

11th, In order to carry the above regulations into effect, it shall be stated in every parish-certificate granted to persons about to change their place of residence, whether or not they have complied with the regulations respecting vaccination.

PART III.

The *third* part of our plan consists, in devising the means whereby the inoculation for the cowpox may be performed, and the progress of the infection examined in the most easy and advantageous manner, amongst all ranks of persons; and this is proposed to be effected in the following manner.

1st, There shall be established Three National Vaccine Boards, viz. one in London, one in Edinburgh, and one in Dublin. These boards shall consist of five members each, to be appointed by Government from among the resident and practising surgeons of the said cities, and are to regulate the business of vaccination throughout England, Scotland, and Ireland respectively. More particularly, they shall each appoint vaccinators properly qualified at the different stations throughout the three kingdoms or nations respectively. They shall each make an official report on the subject to Government at the end of every year, stating the numbers vaccinated, the numbers that may have died before vaccination, and the numbers, if such there may be, that have not been inoculated; and, generally, whatever circumstances may appear to them to be of consequence for the improvement and general adoption of vaccination.

To each board there shall be attached a secretary and an inspector ; both to be appointed by, and to be under the controul of, the separate boards respectively. It shall be the duty of the former generally to manage the correspondence of the respective boards, &c. And of the latter, to visit as many of the head and subordinate stations every year, under the direction of their respective boards, as circumstances shall permit, to examine personally into the state of vaccination, and to make frequent reports on the subject to their respective national vaccine boards ; and, particularly, to notice whatever circumstances may, in their opinion, tend to the improvement and general adoption of vaccination.

These inspectors to be put on a similar footing with inspectors of military and naval hospitals in Great Britain.

Each of these national vaccine boards shall carry on the business of vaccination in the said cities of London, Edinburgh, and Dublin respectively, in the same manner as at the principal or head vaccine stations after mentioned.

2d, There shall be established principal or head stations for vaccination in Scotland, and a proportional number in England and Ireland, or one at least in each county, riding, or rape.

These head stations for vaccination shall be established in the most populous cities or towns of the county or district, and a convenient room appointed where inoculation may be performed GRATIS two days in the week upon all who may apply.

3d, Each establishment at the head stations shall consist of three or more inoculators, according to the population of the city or town in which it is situated, to be appointed

from amongst the resident and practising surgeons of the place by the respective national vaccine board.

It shall be the duty of the members of these establishments to receive, and to correspond with the clergymen respecting the lists of christenings, &c. to perform inoculation, to inspect those who have been inoculated, and to preserve and transmit contagious matter to such of the subordinate stations as may require it.

4th, There shall be established a certain number of subordinate stations, according to the population of the county or district, under the controul and jurisdiction of each of the head stations.

5th, The establishment at the subordinate stations shall consist of one inoculator, to be recommended by the inoculators at the head stations, from amongst the resident and practising surgeons in the district, and appointed by the respective national vaccine boards.

6th, The inoculators at the subordinate stations shall perform inoculation GRATIS at any time throughout the year, when the patient is brought to them for that purpose; but they must attend at their respective stations one or two hours on two days in the week, during the months appointed for the general vaccination, to inoculate, and to inspect those who have been inoculated.

7th, The vaccinators at the subordinate stations shall make out and forward to the head stations of their respective districts, at the close of each period of general inoculation, a list (according to a form given, so as to keep the lists of the children of each congregation separate) of the names of all the children inoculated by them, with the names of their parents, their profession, and place of residence. Also

a list of the names of those children, their parents names, &c. who have not been inoculated, stating whether this has proceeded from the death of the children before the period of inoculation, from the children labouring under any disease which might render the inoculation improper or doubtful, or from neglect in the parents or guardians to bring forward the children for inoculation.

They shall be also required to forward any remarks on the progress of the affection in particular cases, or on the subject in general, which may be deemed of importance to the practice and general adoption of vaccination.

8th, The establishment at the head vaccine stations shall, as soon as they receive the lists from the subordinate stations (vid. Reg. 7.) complete from them the entry made in their books of the lists they received from the clergymen; and from this book they shall make out and return to each clergyman a list of the names of the children, &c. &c. corresponding to that received from him, specifying those who have been inoculated, and those who have not been inoculated, with the cause of non-inoculation. (vid. Reg. 7.) And they shall at the same time also forward to the national vaccine board, copies of the lists returned to the clergymen, the remarks (vid. Reg. 7.) received by them from the subordinate stations of their districts, with such other observations as they may deem of importance to the interests of vaccination.

9th, If any inoculator shall vaccinate a person not belonging to the district of his station, he shall give to the parents, the guardian or the patient, a certificate of his having done so, according to a form prescribed, and shall enter such name in a separate list, to be forwarded to the head vaccine station along with his own proper list.

10th, In order to guard against the importation of the contagion of smallpox into the united empire, it may be necessary that general inoculations should be more frequent in the maritime cities and districts than above specified. And in order speedily to check and subdue the contagion of smallpox, should that disease appear in any of the inland districts, besides putting in force the regulations recommended by the Board of Health, respecting those persons who may be infected, the members of the head vaccine station shall, on ascertaining the fact, order a general inoculation to take place throughout the whole district, or any such part thereof as may appear to them to be necessary, for the purpose above mentioned.

11th, The business of vaccination throughout the united empire shall be confined solely to the members of the vaccine boards and secretaries, and to the vaccinators duly appointed by them, under a severe penalty, or fine, recoverable at common law, and to be given to informers.

N. B. The family physician or surgeon to be permitted to attend during vaccination, but the operation to be performed, and the responsibility to rest solely with the vaccinator employed.

12th, When any inoculator is requested by parents or by guardians to vaccinate children at their own houses, then a remuneration will be required for conducting the operation, such as is given at present to family-surgeons under similar circumstances.

The advantages which would result from confining the practice of vaccination to such persons only, even among those of the medical profession, as are duly qualified to undertake it, are of much importance to society and to the cause of vaccination. It has already been stated, that, from the process

of vaccination having been too often conducted by persons totally ignorant of the laws by which the action of the contagion of the cowpox on the human constitution is regulated, unfortunate mistakes have taken place; pretences have thus been obtained by interested and designing men, for fabricating idle and malicious reports tending to create prejudice in the public mind, at all times prone to resist innovations however salutary, and much detriment has happened to the fame of the discovery itself. By this restriction it is believed that the source of these evils would be effectually abolished; and it would also relieve many surgeons from a species of practice, which to my certain knowledge they regard as troublesome, and too trifling to study, or attend to as they ought, or as its importance to society demands.

By this restriction it is also intended to remunerate the inoculators for their trouble in attending at their several stations at stated periods to dispense the blessings of vaccination, free of all expence, to those who apply for that purpose; for the practice of inoculation being thus confined to the corps of vaccinators, the members of this corps must of course be employed to inoculate all the patients in the higher ranks of life, and will receive from them a remuneration for their attendance; (vide Regul. 11.) and this remuneration will, it is imagined, be full compensation for the trouble to which by the adoption of this plan it is proposed to subject them, without any additional burthen being imposed upon individuals, or upon the public; and it may be remarked, that, as the employment of any inoculator, even in his own district, by persons in the higher ranks of life, and from whom only he can expect to receive any remuneration for his trouble, will in a great measure depend on the degree of celebrity he may have acquired in this important branch of medical practice, that due degree of emulation amongst the members of the vaccine corps, will be established, which, amongst the members

of every profession, is at all times desirable, as a circumstance highly advantageous to the public.

With regard to the expence which must necessarily be incurred by carrying the above plan into effect, it is too trifling to deserve notice, considering the magnitude of the object to be accomplished. The pay of the inspectors, the charge for books, and other articles of stationary, together with a small allowance for the use of rooms, in certain situations where it may be necessary to hire them for the purposes of vaccination, but which, it is thought, would seldom be necessary, as accommodation might generally be had in churches, session and school-houses, dispensaries, &c. will constitute the whole of the permanent expence that appears to be required. This expence must be paid by government for one or two years, until the plan has become effectual; but it might afterwards be defrayed by a general contribution, once in four or five years, in the established churches, and other places of divine worship, throughout the united empire.

Since the above plan was forwarded to his Majesty's ministers, Mr Fuller, M. P. to whom I also sent a copy, has obligingly favoured me with a copy of the following bill, "To prevent the spreading of the infection of the "smallpox," which has, by him, been brought into parliament.

"A Bill (as amended by the Committee) to prevent the spreading of the infection of the Smallpox.

"WHEREAS the inoculation of persons for the disorder called the smallpox, according to the old Suttonian method,

cannot be practised without the utmost danger of communicating and diffusing the infection, and thereby endangering, in a great degree, the lives of his Majesty's subjects, May it therefore please your Majesty, That it may be enacted; and be it enacted by the king's most excellent Majesty, by and with the advice and consent of the Lords Spiritual and Temporal, and Commons in this present parliament assembled, and by the authority of the same, that from and after the first day of August next, no medical practitioner or other persons shall inoculate patients for the smallpox, within the distance of three statute miles, within the distance of the utmost boundary of houses adjoining to each other, of any city, town, hamlet or village of the united kingdom; in which there are ten houses adjoining to each other, under the penalty of forfeiting fifty pounds for every such offence, to be recovered before two magistrates upon the oath of one or more credible witness or witnessess, to be levied, in case of conviction, upon the goods and chattels of the offender; and half of such penalty shall go and be paid to the informer, and half towards the establishment of a fund for the relief of any poor person or persons who may happen to be taken ill of the infectious smallpox, in the parish in which such offence shall have been committed; and which fund shall be at the disposal of the clergyman and churchwardens or overseers of the poor of the said parish for the purposes aforesaid.

“ And be it further enacted, That all medical practitioners or others inoculating for the smallpox or Suttonian method of inoculation, and where infection can be communicated therefrom, without the limits or distance prescribed by this act, shall cause the words “smallpox hospital,” “or pest-house,” written or printed in large and legible characters, to be affixed upon some conspicuous part of the house or houses so employed in or occupied for that

purpose, under the penalty of fifty pounds, to be levied and applied in like manner as herein before directed, for his, her, or their neglect in doing the same.

“And be it further enacted, That in case any person or persons shall be taken ill of the infectious smallpox in any city, town, hamlet, or village in which there shall be ten houses adjoining to each other, that then and in such case the person or persons so taken ill shall be removed by their family or relations, as soon as he, she or they shall be deemed fit, by a medical person, so to be removed, at their own expence, or in case they are deemed incapable of bearing the same, by two magistrates of the district, then at the immediate expence of the parish in which they are so taken ill; and which expence, together with all other reasonable charges, at the discretion of two magistrates of the district, shall afterwards be reimbursed by the parish or parishes to which such persons shall respectively belong, to some convenient and proper distance, such distance to be settled and appointed by a magistrate or magistrates of the district in which such case shall occur, and there be taken proper medical care of, on pain of forfeiting, by the occupier of the house in which such person shall be taken ill, the sum of five pounds for every such offence, such penalty or penalties to be levied and applied in the same manner as herein before directed by this act; and the master, mistress, or principal occupier of any house or houses where such infected person or persons shall be taken ill, or to which he, she or they shall be removed by virtue of this act, and all persons whatever in the united kingdom, having at any time the infectious smallpox in his, her or their house or houses, shall cause the words “smallpox here,” written or printed in large and legible characters, to be fixed on some conspicuous part of his, her or their house, or houses, for so long as the infected person or persons shall actually continue within the same in an infectious state as a smallpox patient

or patients, under the penalty of twenty pounds for neglect in doing the same, for any such offence, to be levied and applied in the same manner as herein before directed by this act.

“ And be it further enacted, That every master or mistress or principal occupier of any house or houses situated within any city, town, hamlet or village in which there are ten houses adjoining to each other, shall within twenty-four hours after the same shall have come to his, her or their knowledge, inform the churchwarden or churchwardens, or overseer or overseers of the poor of the parish in which such house or houses shall be situated, of such infectious smallpox being in his, her or their house or houses, under the penalty of ten pounds for neglect in doing the same, for every such offence, and which penalty or penalties shall be levied and applied as hereinbefore directed by this act.

“ Provided always, and be it further enacted, that no penalty or penalties contained in this act shall be levied within the space of two calender months from the time of the party or parties being convicted of the offence for which such penalty shall be incurred; and if it shall appear to two or more magistrates that the infectious smallpox shall not have spread in consequence of any such offence, or neglect of any of the provisions or regulations contained in this act, but on the contrary that the communication of such infection shall have been effectually prevented by proper and sufficient means, then and in such case it shall be lawful for such justice of the peace or magistrates, and they are hereby directed to remit the whole of any such penalty or penalties, any thing in this act contained to the contrary notwithstanding.”

The purpose of the above bill is to prevent the spreading of the infection of the smallpox; and for this purpose it is

judged proper to enact, that no person shall perform inoculation for the smallpox unless under such regulations as, it is thought, must, with the great body of the people, amount to a total prohibition; and to put persons infected with the disease under such strict regulations as, if fully enforced, would no doubt greatly forward the object of the bill, and might in a short time, perhaps, even extinguish the contagion of the smallpox in these realms. But before carrying these measures into effect, it should be maturely considered, whether or not, under the present existing circumstances with regard to vaccination, the extinction of the smallpox, by the means proposed in the bill, would be advisable. I am clearly of opinion that it would not.

If indeed the efficacy of the vaccine inoculation as a sure preventive of the smallpox was firmly established, and measures adopted for rendering it general and effectual amongst all ranks of persons, no doubt could be entertained of the propriety of the measures proposed in the bill. But while the smallest doubt remains concerning the efficacy of vaccination to produce the desired effect, such measures must ultimately be attended with the worst consequences. For the smallpox being thus much kept under, or even subdued for a time, while no active measures are adopted to render vaccination general, that apathy amongst the lower orders of mankind, so well described by the College of Physicians of London, as the most powerful cause of obstructing the general adoption of vaccination, would greatly increase, and vast numbers of persons would consequently remain liable to be infected with the smallpox; many of whom, either by going into other countries in which the small-pox may still be frequent, or by that disease being again imported into this country, notwithstanding of every measure that may be used to prevent it, or even by its appearance amongst us again *de novo*, for who knows whence the variolous contagion proceeds, will thus be made to suffer severely for this temporary immunity.

The extinction of the smallpox in these realms must, therefore, I apprehend, be accomplished by other measures than those proposed in the above bill; it must be effected by degrees, and vaccination must itself be the chief destroyer of this ancient and formidable enemy of mankind; the contest must be fairly decided between themselves, but it should be remembered, that, in order to put them upon an equal footing, vaccination in its most perfect state must, by inoculation, (for this disease is not infectious like its opponent the smallpox) be rendered as general as smallpox has been for centuries past, that is nearly universal; if, then, vaccination should be found incapable of maintaining its ground against the attacks of the ancient foe, it must of course fall, but if it should happily prove victorious, as there is in my opinion not the smallest room to doubt it will, then the only care necessary will be the adoption of such regulations as may serve to render the practice perpetual as well as general and effectual.

The admitting, therefore, of inoculation for the smallpox, under much mitigated regulations compared with those proposed in Mr Fuller's bill, such as merely confining patients to their own houses, and using means to cut off all communication between the patient, his attendants, and other persons liable to be infected, so as to prevent what is called the natural smallpox, and, at the same time, using every endeavour, by means of some regular plan, short of actual compulsion, to render vaccine inoculation general and effectual, holds out the fairest prospect for diminishing, and in a short time for entirely preventing the spreading of the infection of the smallpox, and the consequent great mortality from that disease. To obtain this result by some regular plan, is certainly, both in a moral and in a political point of view an object highly worthy of the attention of the government of every well regulated state; and it appears to me that the plan,

the outlines of which are detailed above, or some similar one, would be well calculated for this purpose.

It has been recommended by writers on vaccination, and by others zealous in the good cause, that persons not of the medical profession should yet undertake to conduct this new inoculation; and at a very early period of the Jennerian inoculation in this country, a recommendation to this effect was drawn up by Dr Farquharson and myself; and, sanctioned by the managers of the vaccine institution, established at the Edinburgh Public Dispensary, for the gratuitous inoculation of cowpox, it was forwarded to the clergy of Scotland, requesting them not only to recommend the adoption of vaccination as a preventive of smallpox, but actually to engage personally to conduct the operation; and in order to enable them to comply with our request, it was accompanied with a short account of the history of vaccination, with directions for taking and preserving the infection, for performing inoculation, and for judging concerning the sufficiency of the disease produced. We have, however, long since been convinced, that although much benefit may be derived to vaccination from the exertions of the clergy, yet that it is not by their undertaking to conduct the inoculation that this is to be effected; we are more and more convinced that this part of the business, together with the responsibility attending it, should be left entirely to medical men; and I would add to such medical men as have made vaccination a particular study. Mr George Bell, surgeon in Edinburgh, has lately published a second edition of his Treatise on the Cowpox, addressed to the clergy of Scotland, in which he expresses his opinion, "That the support of the clergy collectively is necessary to complete the ultimate success of the cowpox inoculation*," not by recommendation alone

* Vid. Treatise on the Cowpox by George Bell, 2d edit. preface, p. 10. 1807

but by actually engaging themselves in performing inoculation. Here, then, Mr Bell's opinion and mine differ considerably; he thinks that, for the good of society and the cause of vaccination, the clergy should not only recommend, but practise inoculation for the cowpox; and I am clearly of opinion that example and precept are the points to which alone the exertions of the clergy ought to be confined. By adopting the practice in their own families, and by frequently and seriously inculcating the adoption of it amongst the members of their congregations, clergymen will confer a much greater benefit on society, and do more towards rendering vaccination general, than by undertaking personally to conduct the operation.

No person knows better than Mr Bell the great nicety there is, in many cases, in judging of the extent of the vaccine process on the constitution, and consequently in forming our opinion of the security of our patient; and, under these circumstances, I do think that Mr Bell is wrong to represent the business of vaccination in so slight a point of view as he does, when he calls upon the clergy to officiate personally as inoculators. Mr Bell says, "There are still among the common people, chiefly in the country parishes of Scotland as well as England, many religious scruples and other prejudices which ought to be removed. This the clergy are well qualified to do; and I have no doubt but that, by their judicious perseverance, they would soon induce the people to receive generally the new inoculation;" and thus far I perfectly agree with Mr Bell: he however adds, "But I should wish them to go much farther than mere recommendation and argument; in my opinion, every clergyman might easily learn the few essential facts relative to the practice of vaccination; and, when discharging his clerical functions in visiting his parishioners, might inoculate all those who apply to him, or who live at such a distance from a town or village that the assistance of a medical

“practitioner cannot readily be procured. If the clergy of
“this country were *to engage generally and heartily in the mea-*
“*sure*, they would find numberless opportunities of gaining
“the affections of their people, and they would do more to-
“wards extirpating the smallpox than the whole medical
“profession, aided by the legislature, can accomplish. In-
“deed, *if they visited their parishes twice in the year, and in-*
“*oculated all the young children in the course of their pro-*
“*gress, which might be easily done, by devoting to it a few mi-*
“*nutes every day*, the smallpox never could become epide-
“mic in these districts, and would soon be absolutely un-
“known.” Vide Treatise on the Cowpox, page 97, second
edition, 1807.

From this passage one would be led to suppose that the operation of inoculation was so easy,—the extent of the disease produced so readily ascertained by certain well known symptoms,—and the whole business of vaccination so simple, that it might be undertaken by any person, and, indeed, that little or nothing more was necessary than merely to perform the operation of inoculation. If so, how comes it that we have so many cases of mistakes, disappointments, and of supposed failure? Does Mr Bell think, that the cases in which vaccination has been supposed to fail in giving the desired security against the smallpox, have been cases of real failure, *i. e.* cases in which the process of vaccination had been as perfect as possible, rather than cases in which practitioners had been deceived, either from their ignorance, or from their inattention to the symptoms during the progress of the disease? I am certain Mr Bell does not think so, and consequently must be aware that the business of vaccination is not so simple as he has represented it in the above passage.

Again, “from the intercourse and correspondence” which Mr Bell has “had with many of the clergy in various parts

“ of Scotland,” page 97, he must well know that a very great number of that worthy and respectable body of men are far advanced in years, and beyond that period of life when men are inclined to volunteer to “engage heartily” in the study and practice of any new profession, especially of one in which they would experience considerable labour, many difficulties, and a very great degree of responsibility. Besides, it is well known, that a very great number of the country parishes in Scotland extend to the distance of three and four miles, and upwards, from the residence of the clergyman; now allowing that a clergyman has “learned the few essential facts relative to the practice of vaccination,” and that he “visits his parish twice in the year, and performs vaccination to all who apply to him, at such a distance, that the assistance of a medical practitioner cannot easily be procured:” How is his knowledge of these essential facts to be applied so as to enable him to judge of the efficacy of the inoculation? It is not to be thought that the clergyman, “by devoting a few minutes every day to vaccination,” can travel the distance of several miles, so often as may be necessary, to inspect and judge of the progress of the disease; and the same apathy, &c. amongst the parents, which prevents them carrying their children to a surgeon for inoculation, will prevent them carrying their children to the clergyman for inspection at his own house so often as may be necessary for this purpose. But, indeed, this attendance for inspection does not seem to enter into Mr Bell’s plan; yet, concerning the degree of attention that is necessary to mark the progress of the symptoms in the course of the disease, in order to be enabled to form a judgment of its extent, and of the security of our patient, and concerning the bad consequences attending the neglect of frequent and regular inspection, Mr Bell, in another part of his treatise, informs us, “I have already had occasion to state, that there is no one certain test of a patient having passed

“ through the genuine cowpox ; and, that it is only by the
“ most minute attention to every circumstance of the dis-
“ ease, in all its stages, and to the combination and relation
“ which all the appearances bear to each other, that a de-
“ cisive opinion can be formed,” page 66. And, again,
“ The cowpox is comparatively so much milder than the
“ smallpox, that many practitioners think they have done
“ enough, if they inoculate their patient and visit him once or
“ twice during the progress of the disease. But so much de-
“ licacy of observation is requisite to ascertain the regular
“ progress of the genuine cowpox, that every patient should,
“ if possible, be seen at least once in two days, otherwise
“ mistakes will occur ; the practice will fall into disgrace ;
“ and many be thereby deprived of the advantages that would
“ result from it,” see page 65. of Mr Bell’s Treatise.

Concerning the nicety required in performing the inoculation also, and the uncertainty of being able thereby to produce the disease, Mr Bell says, “ a failure is known to take place
“ in a considerable proportion of inoculations, so that many
“ require to be inoculated three, four, or five times before
“ the disease can be produced,” see page 69.

If this be a correct statement of the “ few essential facts
“ relative to the practice of vaccination,” it must be evident
that by clergymen engaging in this practice according to Mr
Bell’s plan, they must occasion more detriment to vaccination,
and to all concerned, than any good which can result from
their exertions, if directed in this channel ; and although I
do not agree in the whole of the above doctrine respecting
the business of vaccination, yet I agree so far as to think
that a very considerable degree of attention is necessary to
inspect frequently and minutely the appearances and symptoms
during the progress of the disease, certainly much more than
could be given by clergymen dedicating a few minutes every
day to this purpose ; and it is chiefly from a

knowledge of this circumstance, that the measure proposed by Mr Bell meets with my disapprobation ; because if this necessary attendance for inspection is to depend entirely on the parents voluntarily bringing their children several miles so regularly, and so often as may be necessary for the satisfaction of the clergymen, the case appears to me to be hopeless ; and if it is to depend on the clergymen visiting the patients at several miles distance, the thing is, generally speaking, impossible.

No. VI.

See page 182

DR ADAMS, author of a treatise on Morbid Poisons, and successor to the late Dr Woodville, as physician to the smallpox and inoculation hospital in London, has, as might have been expected, turned his attention to the investigation of the nature of the vaccine infection, and the laws by which its action on the human constitution is regulated. In 1807, Dr Adams published "A popular view of vaccine inoculation, shewing the analogy between the smallpox and cowpox;" in which he gives what he deems to be "presumptive proofs deduced from the laws of all other morbid poisons, that the variolous and the vaccine are the same," page 37.

Dr Adams, in illustration of this opinion, gives a description of a particularly mild kind of smallpox, which he says is well known to nurses, under the name of the white sort; and which he, from the figure and colour of the pustules, has called the *pearl sort*; of which he says, "the nearer the resemblance is preserved to a pearl, and the smaller the individual pustules, the more perfect is the character," page 25. And he adds, "by continuing, with great cau-

“tion, to inoculate at the hospital from pearl small-
“pox, and afterwards by selecting those arms which had
“most the appearance of cowpox, we at last succeeded
“in procuring a succession of arms so nearly resembling
“the vaccine, that an universal opinion prevailed among
“the parents, that they were deceived by the substitution
“of the one for other,” see page 27. Dr Adams gives the
following cases extracted from his register as instances of
the above position.

August 14th 1805, William Croft was inoculated; with
several others, from a subject who had casual smallpox.
Croft had diarrhoea three days after he was inoculated; a
circumstance in children often favourable for the future dis-
ease.

On the third day the insertion appeared elevated.—6th,
A vesicle.—8th, The vesicle spread.—10th, Has a vaccine
appearance, with fever.—13th, One hundred and fifty pus-
tules appeared, which passed regularly through their stages,
somewhat shortened, as often happens in inoculation.

Rogers was inoculated from Croft on the 26th of August,
and his arm “was perfectly vaccine in all its stages.”

From Rogers, Mary Dobins was inoculated on the seventh
day; and “the arm proved vaccine in all the stages.” No
secondary eruption is mentioned to have taken place on
either Rogers or Dobins.

Richard Jude was inoculated from Rogers, on the same
day as Dobins; and “his arm was vaccine in every stage.”
“On the thirteenth day, as the arm was drying, appeared
“one hundred and fifty variolous pustules,” see page 28
and 29.

Several other persons were inoculated from this stock of virus, and it appears that in all of them, the effect was similar to that in the cases above mentioned.

Dr Adams again renewed his observations on this interesting point in April 1807. "Mary London, a girl about sixteen years of age, was sent to the hospital for inoculation, she was inoculated for smallpox, but the effect of inoculation seemed to be superseded by the casual disease received before she came into the house." The case appears to have been a very favourable one; "though every part exposed was as full as a distinct smallpox could well be," page 154.

"Of sixty-four persons inoculated from Mary London, whose cases can be ascertained from the register, and by subsequent inquiries, it appears that the whole had circumscribed vesicles resembling cowpox;—two others were marked clustered. Of these sixty-four, eight passed through the disease without any secondary pustules; twenty-six had no pustules till after the twelfth day, which is about the period of scabbing, and the remaining twenty-six had pustules between the tenth and seventeenth days," page 155.

The arm of Charles Horwood, one of the above mentioned number, retaining its vaccince character till the eleventh day, was so particularly favourable, that it was selected, we are informed, for inoculation. "This proved to be one of the subjects in whom no secondary pustules appeared. As far as our register, and subsequent inquiries inform us, all who were inoculated from this source passed through the disease without any secondary pustules; though in some, the fever was considerable. From one of them, Caroline Gear, on the tenth day after inoculation, when the arm still retained the regular circumscription of the vaccine

“ vesicle, three subjects were inoculated, in all of whom
“ the disease retained its character. From these cases, ino-
“ culations have been continued for a succession of eight
“ series, each consisting of several subjects ; and in all the
“ same character has been preserved,” page 156. One of
these subjects, Stevens, had a circumscribed vesicle on the
the arm, and an eruption of pustules over the body, which,
on the nineteenth day, were in number 400. “ From
“ Stevens, fluid was taken from the arm and the pustules, to
“ inoculate others. The fluid from the arm produced the
“ vaccine vesicle, though in a few instances attended with
“ secondary vesicles. The fluid from the pustules produced
“ true smallpox pustular cases for three successions,” page
157.

From attentively considering the circumstances detail-
ed in these cases, I am led to draw the following conclu-
sions : 1st, That the disease affecting Mary London, and
also the person from whom Croft was inoculated, was readi-
ly communicated to the human subject either by effluvia
or by inoculation ; but, that the action excited by the vi-
rus of this disease was different when communicated by
effluvia from what it was when communicated by inocula-
tion. 2d, That the eruption of pustules over the body,
which followed inoculation, with the virus of this disease,
was not in consequence of the inoculation, but was in con-
sequence of the exposure of the patient to a highly vario-
lated state of the atmosphere in the hospital at the time of
inoculation ; and, 3dly, That the virus with which these
inoculations was performed, was different from common
variolous virus ; and consequently, that this virus must
either have undergone some change, or that the disease,
which produced this virus, was materially different from the
common smallpox.

Again, it appears that the practice said to be followed by Dr Adams, “of continuing with great caution to inoculate “at the hospital from pearl smallpox, and afterwards to “select those arms which had most the appearance of cow-pox,” was not necessary for the conversion of the disease, in the cases stated above. For neither the case of Mary London, nor of the person from whom Croft was inoculated, appear to have been remarked at the time when virus was taken from them for inoculation, as cases of the pearl sort of smallpox, or to have been selected with the view of propagating from them a mild disease resembling the vaccine; on the contrary, by the selection of Mary London, it was intended to propagate a disease with pustular eruptions over the body, in order to do away an opinion entertained by patients applying for inoculation, that they were deceived by the substitution of the cowpox for the smallpox;* yet the arms of the very first persons inoculated from the pustules on these patients had “a vaccine appearance,” and the affection produced in others inoculated from these arms, was “vaccine in all its stages.”

It must be confessed that the difference in the mode of action manifested by this contagion, when propagated by effluvia, and when communicated by inoculation, is a very singular occurrence, and, if there be no mistake in the detail of the particulars of these cases, renders a farther investigation of the nature of this morbid poison a subject of great interest.

Should Dr Adams be so fortunate as again to meet with similar occurrences in his practice at the smallpox hospital, it would strengthen his opinion of the identity of at least this very particular variety of smallpox with the vaccine dis-

* See Adams on Vaccine Inoculation, page 35, and Appendix, page 154.

ease, if he found that he could communicate it to the cow, and from her again to the human subject, under the legitimate form of cowpox; and especially if he found that about the fifth day of vaccine inoculation, when the vesicle was advancing regularly, two other inoculations performed on the same person, namely, one with this new virus, and one with virus from the advancing vesicle, ran an exactly similar course, that is, were both accelerated in their progress to maturity by the constitutional affection, produced by the first vaccine inoculation, having each an areola, which formed and also faded away, and that both vesicles also dried up at the same time with the primary inoculation. Until, however, these or other equally satisfactory experiments be made, we must suspend our opinion concerning the identity of this disease produced by inoculation, as reported by Dr Adams, with the legitimate vaccine disease of Dr Jenner. And I freely confess that I am more inclined to hesitate in forming any opinion from the circumstances detailed in the above cases, from observing, what I consider to be several important inaccuracies in Dr Adam's statement of the laws and mode of action on the human subject, of some morbid poisons, from which he deduces "his presumptive proofs, "that the variolous and the vaccine" (poison) "is the "same."

After premising the general proposition, that no two local or constitutional diseases will continue at the same time in the same place, or in the same constitution, and to which I freely subscribe; Dr Adams states that, "if a person be inoculated to-day with chickenpox, and to-morrow with "smallpox, the inoculation from the latter will remain un-
"altered till the chickenpox has completed its progress;
"after which the smallpox will begin, and require as many
"days to complete its course, as if the insertion of variolous
"matter had only been made on the day on which the
"chickenpox began to dry." See page 38.

Now this statement I hold to be incorrect; and it is of much importance to attend to this error, because it is by contrasting the statement now made with a statement of the effects said to be produced by inoculating the same person at the same time with the virus of cowpox and of smallpox, that Dr Adams deduces the proofs of their identity.

The above statement I hold to be incorrect in this, that if a person be inoculated to-day with chickenpox, and to-morrow with smallpox, the inoculation from the latter will *not* remain unaltered, as Dr Adams states it will, till the chickenpox has compleated its progress; but both punctures will advance regularly, as if one only had been performed, during the period necessary for the local stage of these infections, and until the constitutional stage from one of them is excited; at which time, and not before, the progress of the other morbid poison, provided its local course be finished, will be arrested, until the first constitutional affection has disappeared. If the first constitutional affection be finished in a few days, the second constitutional affection will follow in close succession; and thus in the instance above stated by Dr Adams, the smallpox will *not* require as many days to complete its course after the chickenpox begins to dry, (if by this the Doctor marks the end of the constitutional affection from chickenpox,) as if the insertion of variolus matter had only been made at that time.

As it is necessary to be distinctly understood in this statement, it may be further illustrated by supposing that the affection produced by inoculation with the virus of chickenpox on the human body, consists of two stages, viz. the local and the constitutional stages; and that the former runs a course of seven days, and the latter a course of five days. Also by supposing that the affection produced by inoculation with the virus of smallpox runs a similar and equal course. Then, according to the statement which I have made, as both inoculations run their local course at the

same time, the constitutional disease excited by the smallpox, or by the second inoculation, will be finished on the seventeenth day from the insertion of the virus: According to the statement made by Dr Adams, it will not be finished until the twenty-fourth day from inoculation.

Again, we are told by Dr Adams, that "the same interruption is produced if cowpox is inserted instead of smallpox, during the time that the constitution is under the influence of measles, or chickenpox," page 39.

If a person be under the influence of the measles, or the chickenpox, as a constitutional disease, and be then inoculated with the cowpox or the smallpox, an interruption in the progress of such inoculation may certainly take place, but this ought not to have been stated by the Doctor to be "the same interruption" as that above mentioned; for, in this instance, the circumstances are materially changed; in the first statement, the second inoculation was made while the action of the first morbid poison was merely local; in this statement, the second inoculation is supposed to be made when the action of the first morbid poison is general on the constitution; the cases therefore are not similar, and therefore to say "the same interruption," is inaccurate.

Although, however, I differ from Dr Adams, in the above statements, yet I agree with him in concluding "that the action of measles, and also of chickenpox, is different from the action of smallpox or cowpox, and that they cannot be maintained at the same time in the same constitution."

With the above statements concerning the progress of the inoculations made with chickenpox and with smallpox, or with chickenpox and with cowpox, about the same time, Dr Adams next contrasts the progress of inoculations made

with smallpox and with cowpox, under similar circumstances; he says, "But if smallpox and cowpox are inserted
"at the same time, in different parts of the same person,
"we find no interruption whatever in the progress of either.
"Both begin and go through their usual courses with the
"same regularity as if only one of them had been inserted
"in two different places," page 40.

This statement I also consider to be in part incorrect. For although I agree, that when a person is inoculated at the same time with smallpox and with cowpox in two different parts, no interruption whatever in the progress of either takes place; yet I must state, that this uninterrupted progress continues only during a limited time, (viz. during the local stage of these morbid poisons,) for as soon as a constitutional affection is produced, by the smallpox for example, if the local course of the other inoculation be finished, the farther progress of the vaccine affection is arrested until the variolous action has exhausted itself on the constitution; or it is altogether superseded according to circumstances. See Appendix, page 6.

Innumerable instances have occurred to convince me of the truth of this position, when inoculation for the cowpox has been performed during the period between a person receiving the casual infection of smallpox and the eruptive fever which was thereby induced: and as we must suppose the same action to be excited on the human constitution by the variolous poison, whether it has been casually or intentionally communicated, I must infer that this poison will observe the same laws with regard to the vaccine poison in either case.

The following is one among many other cases which I have minutely examined, in which the progress of the vac-

cine inoculation was not accelerated by the constitutional action of smallpox (as should have been the case had the vaccine and the variolous poison excited the same action on the human constitution,) but was completely arrested at the period when the constitutional vaccine affection should have taken place.

— Clark, æt. three months, was inoculated at the Public Dispensary on Wednesday the 14th October 1807,— was brought back for examination on Saturday the 17th, at which time the inoculation had evidently taken effect. On Sunday the 18th, the child was observed to be feverish, and on Tuesday an eruption of pimples was observed on the face. On Wednesday, the fever still continued, and the eruption had increased so that the mother thought it improper to carry her to the Dispensary. I saw the child early on Thursday the 22d October, at which time there was still a great degree of fever present; the eruption was very numerous over all the body, and was evidently that of smallpox. The vaccine vesicle on the arm was of full size for the 8th day, and was perfectly characteristic, but there was not, nor had there been, the smallest appearance of an areola around it, so that although the eruptive fever had been present for three days, and the eruption of smallpox had actually taken place, neither of these circumstances had any effect in hurrying on the progress of the cowpox affection by causing the formation of an areola around it.

23d, Has still some fever,—the variolous pustules increasing,—the cowpox vesicle stationary.

24th, Fever nearly gone,—pustules advancing to suppuration,—vaccine vesicle stationary,—still no appearance of areola nor hardness around it.

25th, Is very fretful, and more feverish to-day,—the vaccine vesicle appears to be drying up, no hardness nor in-

inflammation has ever appeared around it, but otherwise, it has been quite characteristic.

26th, Is still very fretful,—the vaccine vesicle seems quite dried up.

28th, The vaccine vesicle is completely formed into a crust,—there never has been any hardness nor inflammation around it, nor has it increased in size since the 8th day from inoculation.

In this case, the constitutional affection or eruptive fever of smallpox did not accelerate the progress of the vaccine vesicle or cause the formation of an areola around it, as the constitutional vaccine action certainly would have done. The progress of the vaccine vesicle, so long as it continued local, held a regular course, so as to be of the usual magnitude about the 8th day. At this time, however, when the constitutional vaccine action should have taken place, the farther progress of the affection was arrested, (by the presence of the variolous action,) no areola being formed, and the vesicle was soon dried into a crust.

Now this is very unlike what would have taken place in the appearance of the vaccine affection on the arm, had the constitutional affection, which was present on the 18th and following days, been the constitutional affection from a former inoculation with vaccine virus; for in this case, the vesicle, which was advancing regularly on the 18th, would have been accelerated in its progress, and in a few hours would have had a well formed areola around it, both with regard to redness and hardness, which areola would have increased for two or three days, and then have gradually died away. This child was repeatedly visited; and the above circumstances noticed by Dr Farquharson and by Mr Abercrombie as well as by myself.

It is also a proof of the statement which I have given above, and against that given by Dr Adams, that in the cases of the Nelsons mentioned at page 43, the constitutional vaccine affection, as evinced by regular vesicles, having areolæ well formed at the usual period, did not accelerate the eruption of smallpox, which took place at the usual time after the infection of that disease had been casually communicated. I must here observe, that if the variolous and vaccine poisons were the same, as supposed by Dr Adams, and produced the same action on the human constitution, there would not have been any eruption of smallpox in the above cases of the Nelsons, nor in the cases detailed by Dr Woodville, nor in those detailed by Dr Adams himself, at so late a period as the 13th day from inoculation; for if the variolous and vaccine action were the same, the progress of the former would have been accelerated by the presence of the latter about the eighth or ninth day from inoculation, and both would have advanced to maturity together, in the same way as happens when a person is re-inoculated with vaccine or with variolous virus, five days after a first inoculation with the same virus; or as when a person is inoculated with smallpox infection, and is at the same time exposed to it casually; in this case only one disease is produced, viz. that by inoculation, for the action of the infection communicated casually, being accelerated by the constitutional affection which is excited by the inoculation, both are as it were united, and run their course together. That this is really the case, is proved from this circumstance, that if the inoculation should, from any accident, prove ineffectual, the effect from the casual infection takes place about the usual time, i. e. about the 12th day; but if the inoculation proves successful, the symptoms of constitutional affection take place four or five days earlier, and no fever, nor second eruption, corresponding to the usual period of the appearance of the constitutional symptoms from the casual infection, is afterwards observed.

Dr Woodville first observed, that, if a person be inoculated with the variolous poison every day until the fever induced by the first inoculation takes place, all the other punctures have their progress at that time accelerated, and that in the course of one day from the appearance of the fever, even that puncture which had been last made equalled in maturity the one first made ; the same thing holds true with regard to similar inoculations made with the vaccine virus.

Founded upon this law constantly observed in the action of these morbid poisons, Dr Adams still offers a farther proof of the identity of the vaccine and the variolous poisons ; he says, “ If smallpox is inserted to day, and the same subject “ inoculated three or four days after with cowpox, or with “ cowpox to-day, and three or four days after with smallpox, “ the same consequences will follow as if both insertions had “ been of smallpox only, or of cowpox only ; that is, each “ will arrive at maturity at the same time, and the only difference will be that the last insertion will produce a smaller pustule or vesicle.” Page 42.

I am extremely sorry to be again obliged to differ from the above statement given by Dr Adams, especially when I consider that the investigation of the nature and mode of action of those morbid poisons which are capable of being communicated to the human subject, has for many years been his favourite study, and consequently that he must be better acquainted than I can be, with the appearances in the various experiments necessary to be made in order to ascertain these laws, and also with the legitimate conclusions to be drawn from these experiments. As Dr Adams, however, has not given the above statement on the authority of experiments conducted by himself, I must beg leave to state the following experiments which, among many others, I have made regarding this point, and which appear to me to warrant a conclusion quite different from that stated by Dr Adams.

J. Alston, æt. 5 months, was inoculated in the left arm with vaccine virus on Thursday the 21st April 1808. The operation was successful, and she was re-inoculated on the beginning of the 6th day, i. e. on Tuesday the 26th April, by one puncture with variolous virus on the right arm, and by another with vaccine virus, on the same arm, from the advancing vesicle.

29th, An areola appeared in the course of yesterday around the primary vaccine vesicle, and a beautiful small areola, about the size of a shilling, is now formed around the vesicle of the second inoculation; and the vesicle itself, although small, is quite characteristic. The puncture from the variolous matter has evidently taken effect, but is only a little elevated, and feels hard on passing the finger over it.

30th, The areolæ of the first and second vaccine vesicles very complete.

The puncture from the variolous matter advances regularly, but without inflammation, or apparent acceleration.

May 31st, The areolæ around the first and second vaccine vesicles declining.

The variolous puncture still advancing, but there is no redness around it, nor apparent suppuration in the pustule, in short no acceleration of its progress from that of a primary inoculation during its local course.

3d, The areolæ of the vaccine vesicles are now gone, and the vesicles are drying.

The variolous pustule is now well formed, and contains purulent matter.

4th, The variolous pustule dying away ; there has been no particular redness around it, nor eruption of other pustules, as frequently happens during the eruptive fever from inoculated smallpox.

— Gillies, æt. 6 months, was inoculated with vaccine virus (obtained from a vaccine crust which had been preserved for 8 months) by two punctures on the left arm, on the 31st May 1808. Both punctures advanced regularly, and on the 6th June she was inoculated by one puncture in the right arm with smallpox matter, and by another puncture in the same arm with vaccine virus from the advancing vesicles.

June 9th, An areola is well formed around each of the primary vaccine vesicles, and there is also a very distinct areola around the second vaccine inoculation ; and the vesicle, although small, is well formed.

The variolous puncture feels hard on passing the finger lightly over it, and is somewhat elevated, but no surrounding inflammation or apparent acceleration from the progress of a primary inoculation is observed.

11th, The areola around the second vaccine inoculation was very bright and well formed yesterday, and still continues so, and the vesicle appears to be at its height.

The puncture from variolous inoculation is advancing in the usual slow manner of a primary inoculation.

12th, All the vaccine vesicles are drying fast into their proper crusts.

The variolous pustule still advancing, and contains purulent matter.

13th, The variolous pustule still contains matter, but without any surrounding inflammation or eruption of other pustules.

14th, The variolous pustule drying into a crust.

The crust fell off from the second vaccine inoculation yesterday.

15th, The variolous pustule is quite dried into a crust.

In these cases a great difference between the progress of the second vaccine inoculation, and that of the inoculation with the virus of smallpox, was clearly and distinctly marked; for the progress of the former was suddenly accelerated to maturity on the appearance of the areola marking the presence of the constitutional vaccine affection around the vesicles of the primary vaccine inoculation; while the progress of the latter was slow, resembling that of the local stage of a primary inoculation, or that which sometimes takes place when a person is inoculated with smallpox virus who had months or years before gone regularly through the cowpox or the smallpox.

From these circumstances, I am induced to conclude that the variolous and the vaccine poisons are in themselves materially different, also that they excite actions on the human constitution which are essentially different from each other, and consequently, notwithstanding of the cases given by Dr Adams, as above mentioned, that these poisons can never be converted into each other.

The infection of the cowpox has been regenerated under my own observation about four hundred and fifty times on

different persons, and although there have been among these great variety of constitutions, &c. upwards of ten thousand persons having been inoculated, yet neither my colleagues at the Vaccine Institution, nor myself, are sensible of the smallest difference in its mode of action, nor of the smallest approximation in its symptoms to those of the small-pox.

No. VII.

See page 113

DIFFERENT opinions have been entertained concerning the propriety of inoculating persons with the cowpox, who may at the time be affected with scald-head, ring-worm, and other eruptions which are attended with very little, if any, perceptible fever. Dr Jenner is opinion that these diseases lessen, and, in many instances, altogether prevent the anti-variolous effect of the vaccine inoculation. "Vaccination on an herpetic skin produces every gradation in the state of the pustule (vesicle) from that slight deviation from perfection, which is quite immaterial, up to that point which affords no security at all." Vide Jenner on the varieties and modifications of the vaccine pustule occasioned by an herpetic state of the skin, page 6. note.

Hence some of the instances of failure in vaccination to give security against the smallpox have been attributed to the presence of these diseases at the time of inoculation.

As an instance how little will, in some cases, disturb the regular progress of the vaccine vesicle, and render vaccina-

tion ineffectual, Dr Jenner gives the following very instructive history : “ A family of the name of Haselton, consisting
“ of five fine healthy looking children, were inoculated by
“ me with fluid virus taken immediately from a proper vaccine pustule (vesicle.) On examining the punctures on
“ the fifth day, I found that on the left arm of one of the
“ children the pustule (vesicle) was advancing too rapidly.
“ It was of an irregular form ; contained already an opaque
“ fluid, and was surrounded by an efflorescence of a dusky
“ red colour to the extent of one-third of an inch. Such
“ an intolerable itching was excited that the boy (who was
“ only three years old) could not be prevented from rubbing it. This appearance led me to an examination, and
“ on the child’s head I observed an herpetic blotch not much
“ larger in circumference than a shilling. The hair around
“ the part was stiffened by the concreted ichor oozing from
“ the sore, which had made its appearance *about ten days*.
“ No eruption shewed itself in any other part of the body.
“ The pustule was repeatedly broken by the child’s scratching and rubbing it ; and the inflammation on the arm,
“ which began to spread so early, on the eighth and ninth
“ days became very extensive. The child at the same time
“ was hot and restless. A soft amber coloured scab now
“ began to form, but this being rubbed off, the part ulcerated and healed slowly, *leaving a cicatrix deeper and larger*
“ *than in ordinary cases.* The disease on the scalp was now
“ quickly subdued by the use of the tar ointment, and at
“ the expiration of six weeks from its commencement, the
“ inoculation was repeated ; when a pustule (vesicle) formed, which went through all its stages with perfect regularity. The rest of the children inoculated at the same
“ time went through the cowpox in the ordinary way without any irregular appearance.” Vide *ut supra*, page 9.

On the other hand, Dr Jenner, in the same publication, at page 11, gives an instance of a child whose face was involv-

ed in one continued crust, in whom, however, the progress of the symptoms of vaccination was quite correct, and effected a cure of the herpes, which had for nearly two years resisted every application made for that purpose. “On the “decline of the vaccine vesicles, the incrustation (on the “face) began to be less coherent and to drop off, and at the “expiration of a fortnight, the face was smooth, no vestige of “the disease remaining except a slight inflammation of the “eye-lids.” Dr Jenner adds, “cases of this sort have become familiar; Mr Ring has given several in his very copious treatise on the cowpox, and they have been mentioned by other authors both here and on the continent.” And also, “I have in like manner sometimes seen papulous “eruptions which had long proved troublesome speedily “swept away.”

Dr Coxe of Philadelphia mentions a case of *tinea capitis* which had continued about seven months, and had extended over the whole head, in which inoculation with vaccine virus, after having twice failed, succeeded on a third trial, and not only advanced through all the stages regularly, but also effected a cure of the former disease. The patient was afterwards fully exposed to the infection of the smallpox with impunity. See Med. and Phys. Journal, page 340. vol. xviii. According to the reports of the French inoculators, the scald-head, *crusta lactea*, and other herpetic eruptions, have not, amongst them, appeared to impede the regular progress or efficacy of vaccination. *U. s.* vol. xiii. p. 250. The experience of Dr Wood of Newcastle, and of Mr Anderson, also authorises them to draw the same conclusion. *Ut supra*, vol. xv. p. 137.

* I have inoculated children affected with scald-head, *crusta lactea*, or milk blotches, and various other eruptions, which were attended with no perceptible fever; and I have observ-

ed that in some of these patients the progress of the vesicles was quite regular, and there was obtained complete evidence of a constitutional vaccine affection, by the test of a second inoculation conducted in the manner hereafter mentioned ; while in others such a degree of itching was excited at the part inoculated, that the vesicle was unavoidably and completely destroyed, by rubbing or scratching it at a very early period ; or such a degree of inflammation took place on the second or third day after inoculation, as to destroy the structure of the vesicle, and to occasion a pustule containing purulent matter ; which pustule generally terminated in a similar manner with the eruptions formerly occupying the other parts of the body. Nor were these irregularities of the vaccine vesicle overcome, unless by first curing the primary eruptions, after which the patients passed regularly through the process of vaccination.

To account for the various results of vaccination in different individuals, under the above circumstances, and consequently for the different opinions entertained by practitioners concerning the propriety of inoculating persons for the cowpox who may be at the time affected with the different eruptions above mentioned, I would observe that each of these eruptive diseases is to be considered as consisting of two stages, neither of which have any known fixed period of duration. The first of these may be called the acute stage, during which there is present in the body more or less of a constitutional morbid action. This is often evinced by the slightest scratch, on skin which is apparently sound, occasioning an unusual degree of inflammation, and quickly running into suppuration, or terminating in a festering and troublesome sore. The second may be called the chronic stage, during which the constitutional morbid action has greatly or altogether subsided, and the disease is continued by habit, or has become as it were domesticated in the constitution, in the same man-

ner as some of the symptoms of hooping cough are continued long after all fever and infection from that disease have ceased. During the former of these stages, inoculation for the cowpox is improper, and must generally fail to impart the desired security against the smallpox, while in the latter stage the inoculation may not only be done with safety but with a fair prospect of curing the former affection by changing the state of the skin, or of the constitution, by means of the vaccine action; on the subsiding of which the natural or healthy state of the skin will again be established.

Seeing then that from experience, as well as from the above reasoning on the subject, much doubt must generally occur concerning the security of our patient against the smallpox infection, if inoculated while affected with any of the above mentioned eruptions, it ought always to be an established rule in practice first to cure the eruption, and after some time, *i. e.* after the natural healthy state of the skin has been established, to subject the patient to vaccination. If, however, this rule cannot be observed (as from a variety of circumstances may sometimes happen) then the whole of the symptoms during the progress of vaccination must be examined with the most minute attention, and the smallest irregularity in any of these must be regarded as a cause of uncertainty whether the operation has been effectual, and for re-inoculation at some future period; otherwise inoculation under such circumstances must continue to prove a fruitful source of disappointment to all concerned.

The impropriety of inoculating persons labouring under any of the acute diseases to which mankind are liable, as fevers of different kinds, fluxes, &c. is too obvious to require notice here, but when any of these diseases supervene before the process of vaccination has been completed, then, as the vaccine action may, by the presence of any of these diseases

in the constitution, be either impeded, or altogether prevented, the symptoms must be very diligently attended to, and the result of the operation judged of by the rules hereafter mentioned for ascertaining the presence of the constitutional affection of cowpox.

How long after exposure to the infection of smallpox we may inoculate for the cowpox, with a fair prospect of preventing that disease, is very uncertain. I have frequently been disappointed, but more frequently have I succeeded in preventing the smallpox, when I have inoculated persons with the cowpox two or three days after they were exposed to the smallpox infection; I have also frequently succeeded, by the same means, in preventing the smallpox in persons who had been fully exposed to the infection by living in the same room for seven, eight, and even ten days, with patients labouring under that disease; and here I have to remark a curious circumstance, although it be one which I have frequently observed, viz. that persons living in the same house or room with others labouring under smallpox, are not so readily infected as strangers who may happen to be introduced for a short time only into the room in which the patient lies.

It has been observed by Dr Jenner, that persons who have recently been using much sulphur cannot readily be infected with the cowpox. Of thirty persons recently cured of the itch by a course of sulphur, and inoculated immediately afterwards by Dr Jenner, not one took the disease. My own experience leads me to acquiesce in this observation of Dr Jenner; but whether this seeming power of resisting the vaccine infection when the body is charged with sulphur depends on some particular action excited in the skin, or in the constitution, by the sulphur, which is inimical to the vaccine action, or whether it depends merely on the fumes of the sulphur mixing with the vaccine fluid, and so rendering it inert,

has not been determined. With a view of ascertaining this point, I made the following experiments. A quantity of vaccine virus was collected from several vesicles upon a plate of glass. From this stock two patients were inoculated by two punctures made on each. With the remainder of the virus I now mixed a small quantity of the flowers of sulphur. This mixture was exposed to the heat of my hand, and the virus and sulphur were well incorporated for several minutes: several persons were then inoculated with it. The affection in all proceeded with a perfectly regular and equal progress, so that on the eighth day from inoculation no difference was perceptible between those inoculated with the pure virus and those inoculated with the virus mixed with sulphur. As far as these experiments go, we may conclude, that the power of resisting the vaccine infection in persons who have recently used much sulphur depends on a particular action excited in the skin or on the constitution, which action is inimical to the vaccine action.

Persons who undertake to conduct vaccination cannot be too careful in examining into the state of health of their patients before performing the inoculation. Every inoculator must have observed, that from very slight causes operating on the skin, or on the constitution, the regular progress of the vaccine affection has been more or less disturbed, and frequently rendered altogether ineffectual. This I have very frequently experienced during the irritable and feverish state induced in children by teething, even when little apparent indisposition was observed.

I would therefore recommend, that it be observed as a general rule, never to inoculate any person with the cow-pox who is, after minute examination, discovered to be labouring under any morbid state or affection whatever, either local or constitutional, which it is in the power of the me-

dical art to remove, or which may only require a little time to be by nature changed into the healthy state. Thus, I am certain, we should cut off one great source of failure in vaccination, and thus also we should avoid many of those causes which have led to much perplexity in forming an opinion concerning the future security of our patient against the attacks of the smallpox.

NO. VIII.

See page 136

It affords me much satisfaction to find that the mode of obtaining and preserving the cowpox infection which I have proposed, viz. by using the crusts of the vesicles, has been practised with great success by inoculators in all quarters of the globe.

Early in the year 1803, I sent a vaccine crust to Dr Jenner, and requested that he would make trial of it for inoculation. The following extract from his letter, of date 15th April 1803, in answer to mine, shows the result. "I put your crust into the hands of Mr Ring, who informed me yesterday that it had succeeded in producing a perfect pustule (vesicle). Experience now tells us this is a good mode of sending the virus to distant parts."

Dr Coxe of America has used the vaccine crust with great success in producing perfect vaccination: he says, "I have lately succeeded in exciting the cowpox with a scab nine months and three weeks old, the longest period, as far as I know, in which it has proved successful:" He adds,

“ this discovery of Mr Bryce, respecting the scab, is of vast
“ importance, as it will enable us to preserve the infection
“ amongst us, I hope, without difficulty*.” Dr De Carro, physician in Vienna. has also found that matter procured by dissolving the vaccine crust generally proves successful in exciting the cowpox †.

In one of the official reports of Mr Shoolbred, superintendent general of vaccine inoculation in Bengal, are contained many instances not only of the efficacy of the vaccine crust in exciting cowpox regular in all its symptoms, but also of the great superiority which, in that country, this mode of preserving the virus possesses to every other.

In accounting for the little progress made in vaccination in the upper provinces of Bengal, Mr Shoolbred says, “ The
“ extreme difficulty of keeping up the disease in a very high
“ temperature of the atmosphere, even by inoculating from
“ subject to subject with recent fluid matter, as noticed in
“ my report of last year, seems to be the principal cause
“ that so little has been done at the vaccine stations beyond
“ Patna. So early as April last year, I began to experience
“ such frequent failures in my inoculations with recent fluid
“ matter, that I became seriously alarmed for the loss of the
“ virus under my own charge. I therefore wrote to the dif-
“ ferent superintendants to put them on their guard against
“ such an occurrence. From the subordinate stations at
“ Dacca, Moorshedabad, and Patna, I received satisfactory
“ answers, assuring me that their inoculations continued to
“ be successful, and that they were then under no apprehension
“ of losing the disease. But at Allahabad, the disease had

* Vide Med. and Phys. Journal, vol. xiii. page 48.

† Vide ut supra, page 250.

“ been lost, even before the receipt of my letter. This hap-
“ pened on the 20th April 1804, from no obvious cause, Mr
“ Gibb having then failed in communicating the disease to
“ five patients, whom he had inoculated with fresh fluid
“ matter in each arm with the greatest care. Mr Gibb,
“ during the hot months and the rains, made several unsuc-
“ cessful attempts to restore the disease by means of dried
“ matter; and even when the weather became colder, in
“ October, November, and December, his exertions to that
“ effect, although directed with the utmost zeal and atten-
“ tion, were equally unavailing. Matter was supplied to
“ him liberally by Mr M’Nab, and all the methods then in
“ use were assiduously persevered in for upwards of two
“ months, during which he inoculated ten or twelve children
“ weekly, all however without effect, until Mr Evans sent
“ him a mature vaccine scab from Cawnpore on the first of
“ January, with which he at last succeeded in producing
“ the disease. This is a method of preserving the vaccine
“ virus in a state of activity with which we have only lately
“ become acquainted, and of which farther notice will be
“ taken presently.

“ The history of the failure and restoration of the disease
“ at one station will apply pretty exactly to the whole of
“ those beyond Patna, at which such an accident has occur-
“ red. It has happened uniformly from the failure of inocu-
“ lation with recent fluid matter in the hot weather, without
“ any obvious cause to which such failure can be ascribed,
“ unless it be to the virus having actually lost its infecting
“ quality; and as long as the hot weather continues, it has
“ hitherto been found extremely difficult, if not impossible, to
“ restore it. At Benares and Cawnpore, the disease was lost
“ nearly at the same time as at Allahabad, and the same
“ thing happened in Gorruckpore, where Mr Fraser, from
“ the more moderate temperature of the climate, entertained
“ hopes of preserving it through the year. It was preserved

“ at Furruckabad till September, when it also failed at that
“ station as at the others, by an apparent loss of power in the
“ virus. To all these stations it was found to be impossible to
“ restore the disease by the usual means of transmitting mat-
“ ter: *they were at length, however, put in possession of the virus*
“ *at Furruckabad in October, at Cawnpore in November, and*
“ *at Benares and Allahabad not till January, all by means of*
“ *the dried scab, after other methods had repeatedly failed.**”

After farther pointing out the circumstances which tended to impede the practice of vaccination from becoming general, and which, from a great variety of correspondence with the inoculators at the different vaccine stations, appear to have been partly the prejudices and apathy of the natives with regard to inoculation, but chiefly the difficulty, from the heat of the climate, of obtaining and preserving the virus in an active state for propagating the disease, Mr Shoolbred adds,
“ Having occupied so much of the time of the Board in de-
“ tailing the obstacles which have hitherto tended to impede
“ the progress of vaccine inoculation, I have much satisfac-
“ tion in being now able to point out some circumstances
“ which promise in a short time to lessen, if not entirely to
“ remove, both the difficulty arising from the climate, and
“ from the prejudices hitherto entertained against the disease
“ by the natives. These consist of *a new and more succes-*
“ *ful method of preserving the virus in an active state*, and
“ in the recent adoption of such measures as cannot fail to
“ conciliate the good will of the smallpox inoculators, and to
“ inform the natives in general of the true nature and great
“ utility of vaccine inoculation.”

* See Report on the state and progress of vaccine inoculation in Bengal during the year 1804, submitted to the Medical Board at Fort William, by John Shoolbred, superintendant-general of vaccine inoculation. Printed at Calcutta in 1805.

“ In the appendix to my Report of last year, I enumerat-
“ ed all the methods then known for preserving the virus in
“ an active state ; namely, the armed lancet, the impregnat-
“ ed thread, the plain glass plates, the glass plates with a
“ cavity for containing the matter, the thorn, the ivory lan-
“ cet, and the very ingenious exhausted tubes of Mr Giraud.
“ All these methods were found to be exceedingly precarious
“ except the last, and of that it was impossible to make any
“ considerable use owing to the want of tubes in this coun-
“ try. Through the assistance of Dr Dinwiddie, however,
“ I procured a few tubes, by one of which I succeeded in re-
“ storing the disease to Prince of Wales’s Island, after a pas-
“ sage of eighteen days, and as the virus in the tube continu-
“ ed at that time as fluid as when taken from the pustule, I
“ have no doubt but it would have retained its infecting
“ quality for a much larger period. In that belief I com-
“ missioned a considerable assortment of the tubes from their
“ ingenious inventor, but which the knowledge of a still
“ easier and better method of preserving the virus will now
“ render unnecessary.

“ This method, as simple as it is effectual, consists merely
“ in the preservation of the peculiar scab or crust into which
“ the vaccine pustule is gradually converted towards the
“ conclusion of the disease, and in which the virus in a dry
“ state is found to reside with unimpaired activity for a great
“ length of time.

“ It was not till September or October last year, that I
“ became acquainted with this valuable property of the ma-
“ ture vaccine scab. I then first saw the Treatise on Cow-
“ pox published by Mr Bryce in 1802, who has the merit of
“ first introducing us to the knowledge of this useful disco-
“ very. I immediately made trial of it ; and was much gra-
“ tified to find, that with a scab a month old from the time
“ of its dropping from the arm, I succeeded nearly as well.

“ as with recent fluid. Having an application for virus from
“ Cawnpore in November last, I divided a scab, and sent
“ one half to that station, and the other to Prince of Wales’s
“ Island : It succeeded perfectly at both places ; at the latter
“ after it had been kept merely wrapped up in writing paper
“ for thirty-four days. A scab has also succeeded at Fort
“ Marlborough, after a passage of forty-four days ; and I
“ have lately used one four months and a half old, on two
“ children, making two punctures on each of their arms,
“ which produced not less than six perfect pustules (vesicles)
“ and the disease in every respect went through the regular
“ course. The discovery of the preservative quality of the
“ scab must therefore be considered as a circumstance of the
“ greatest importance to the future progress of vaccination,
“ leaving nothing farther to be desired on the very delicate
“ and difficult subject of preserving the virus and transmit-
“ ting it to distant places.”

“ His Excellency the Most Noble the Governor General
“ in Council had authorised the sending of children from
“ Prince of Wales’s Island to China, in order to transmit the
“ disease to Canton by means of successive inoculations.
“ But as Mr Herriot at Prince of Wales’s Island was made
“ acquainted with the properties of the vaccine scab before
“ that intention could be carried into effect, the trouble and
“ expence of this plan may now be saved by his forwarding
“ scabs by the China ships as they pass Prince of Wales’s
“ Island on their voyage. The same thing may be said of
“ transmitting the disease to New South Wales, or wherever
“ else it is likely to meet with a cordial reception.”

Extract of a letter from C. Campbell, Esq; to Jo. Shoolbred, Esq; dated Fort Marlborough, 7th April 1805.

“ We have every hope of naturalizing the vaccine disease
“ to this island. The prejudices of the natives daily yield,

“ and the whole of the southern regions willingly receive it.
“ The disorder is carefully kept alive at two stations, and had
“ we any fears of losing it by any untoward accident, the
“ precaution of preserving the vaccine scab at intervals would
“ give the greatest security.”

The following extract of a letter from Mr Reed to Mr Shoolbred, announces the introduction of the vaccine inoculation into the city of Delhi, by means of the vaccine crust, and the inoculation of the royal family residing there.

“ Sir, I have the pleasure to inform you, that I have succeeded in procuring the vaccine disease. On the 12th of last month, I received a scab from Futteh Ghurr, with which, on different days, I inoculated fifteen children. From one of these, I on the 24th inoculated two other children, and from them, on the 31st, three more; and on the 6th instant, I carried one of them into the palace, and inoculated Mirza Selim the son of Acbar Shah, the king's eldest son, and also one of the young princesses. It succeeded perfectly well with both; and I yesterday from them inoculated four more of the house of Timur. They are quite delighted with it in the palace, and the children are there so numerous, that I hope to have a regular supply for a long time. They know nothing of the cowpox in this part of the country; nor can I find that inoculation for the smallpox was ever practised at Delhi; it certainly is not at present, and that disease is often fatal to vast numbers.”

Dated “ Delhi, 13th June 1805*.”

In addition to the above evidence concerning the efficacy of the vaccine crust in reproducing the cowpox affection re-

* See Mr Shoolbred's Report, *ut supra*.

gular in all its stages, I have to add the united testimony of my colleagues at the Vaccine Institution of this place, for the gratuitous inoculation of cowpox, where we have very often restored the disease in its perfect state, when the recent infection had been lost from the non-attendance of the children at the proper period for taking it; and have also, times almost innumerable, inoculated the same person in one arm with recent virus, and in the other with virus obtained from a crust, without being able to observe any difference either in the appearance of the vesicle, or in the regularity of the symptoms thus produced.

The attention necessary in selecting the proper crusts has been mentioned at page 123; and I have now only to observe, that when the margin of the crust is observed to be of a much lighter colour than the centre, the light coloured part should be cut off, and the central dark coloured part only used; the harder and more brittle the crusts are, they will be found to be the more efficacious. If they be light-coloured or tough, it marks them to have been formed from, or mixed with, a large proportion of purulent matter, and therefore improper to be used for inoculation.

By soaking one of the proper vaccine crusts in cold water in the manner already mentioned, and spreading the solution of a moderate degree of thickness over a small plate of glass, as mentioned at page 115, or upon the stopper of the phial described at page 116, and allowing it to become perfectly dry, it will be found to retain its activity for a very long period. I have thus preserved it active upwards of five months; inoculating from it every ten or fourteen days, till the whole was expended, in order to ascertain for how long a period it would continue to produce the disease. It is to be observed, however, that when using the crusts thus prepared, no more of them should be dissolved at a time than may be necessary to perform the inoculations re-

quired, and the glass plate or stopper, upon which the remainder is lodged, should always be allowed to become quite dry again before it is covered up. If the crusts, either before or after being prepared, as above mentioned, be kept in a damp state, and in a high temperature, they soon acquire a strong and peculiar smell, which marks the loss of their power to reproduce the cowpox, and that they have become useless.

Besides the advantages already mentioned as resulting from this new mode of obtaining and preserving the infection of cowpox, it is farther to be observed, that, by using the crusts for inoculation, the progress of the vesicles will not be disturbed by puncturing them, nor will they be exhausted of virus at an early period of the disease; the prevention of which, when we consider that, from these circumstances, festering and troublesome sores are sometimes produced, and more especially that from them the antivariolous process is frequently prevented from taking place, we must regard as of considerable importance in conducting vaccination.

Dr Clark of Nottingham has stated that if the vaccine vesicles be broken at an early period of the disease, and continue to discharge their contents, even although an inflamed and indurated areola may be formed around each, at the proper period of the affection, yet in such cases the constitutional vaccine action does not always take place, as is proved by patients under such circumstances passing again regularly through all the stages of the cowpox on being reinoculated. *Med. and Phys. Journal*, vol. xvi. page 137. On the subject of the vaccine vesicles being rubbed and broken either accidentally or intentionally, and of draining them of their contents, by taking virus from them for inoculation, as causes of failure in vaccination, to afford the desired security against the smallpox, see the "Address of the Royal Jennerian Society," page 40, 42, 43. Obs. by Mr Dunning in *Med.*

and Phys. Journal for June 1805. Dr Willan on Vaccine Inoculation, page 33. Mr Ring's Obs. Med. and Phys. Journal, vol. xiv. p. 403. Treatise on the Cowpox, by Geo. Bell, 2d edit. page 32. Adams on Vaccination, page 111.

As a knowledge of the disadvantages as well as of the advantages attending the different modes recommended for obtaining and preserving the vaccine infection is of much importance in practice, I shall beg leave to make some farther remarks on these points.

The mode of obtaining and preserving the vaccine virus, which is chiefly recommended by the committee of the Central Society for propagating the cowpox in France, consists in applying one extremity of a capillary tube to a vaccine vesicle, *open over its whole surface*; the fluid matter rises in the tube, and when the latter is filled, both of its extremities are sealed with sealing-wax. This mode of obtaining the infection implies the complete destruction of the vesicle from which it is obtained; for if a vesicle be *opened over its whole surface*, at the proper period for taking the virus, it will not readily dry up again, so as to run a regular course, but will in almost every instance continue to discharge its contents as fast as they are secreted, and will generally terminate in a suppurating and troublesome sore. Besides, if there be not at least one other vesicle on the same patient which is left entire, the object of vaccination may, by this rude treatment, be frequently left unaccomplished, even although an inflamed and indurated areola be formed around this open vesicle at the proper period of the disease.

With regard to the virus being preserved in an active, and although fluid, in an unchanged state, in the capillary tubes, the experience of the French inoculators certify to us that it is so, and that certainly is the best criterion to judge from; but I am convinced, from my own experience, that however

completely it may be secluded from the external air, the vaccine virus in a fluid state is much more apt to undergo some change whereby its qualities may be deteriorated, if not altogether altered, than when it is preserved in a dry state. Mr George Bell appears to approve of the whole of the above practice as recommended by the French inoculators : he says, “ The method proposed by Mr Brettonneau, and “ recommended by the committee in Paris for preserving the “ vaccine virus in its fluid and active state, is extremely ingenious, and I have no doubt of its answering the purpose “ completely *.” But Mr Bell does not seem to have recollected that this rude mode of treating a vesicle, at an early period of the disease, may often be attended with very bad consequences †, nor to have known, that the same mode of preserving the virus had not only been proposed but practised in this country several years ago, but did not always answer the purpose completely. Dr Wood of Newcastle-upon-Tyne, informs us, that “ Some vaccine matter was preserved “ last winter (1803) for nearly six months at the Dispensary “ here in capillary tubes hermetically sealed ; it had been “ preserved so before, and answered very well. This last “ spring, all the children (about 200) inoculated with this “ matter, had their arms violently inflamed, and, instead of “ the regular pustule and scab, a large crust of a brown colour, with ulceration, took place.” *Med. and Phys. Journal*, vol. xiii. page 61. This virus, therefore, although completely secluded from the external air, must have undergone some change, whereby it was injured for the purposes of inoculation ; for although the desired security against the small-

* See *Treatise on the Cowpox*, page 24.

† See *Treatise on the Cowpox* by George Bell, page 32.

pox appears to have been obtained by the persons who were inoculated with it, yet the symptoms produced by it were so unusual and severe, that the inoculation was stopped until fresh infection was received from London, which produced the disease in its usual mild form.

Mr Bell in his treatise on the cowpox, when giving instructions about preserving the virus, says, "If the inoculation is " to be performed *in the course of a few days*, or if the matter " is to be sent to a short distance only, it may be taken on a " lancet;" which lancet he recommends to be wrapped up in a piece of tin-foil, or gold-beater's leaf, &c., to prevent the matter from being injured by exposure to the air. See page 19. In a point of such importance as that of preserving the vaccine virus unchanged, the above instructions appear to be too vague; for the term "*in the course of a few days*," may imply four or five days, or even more; a period much too long in my opinion for the vaccine infection to remain on a common lancet, without undergoing a considerable change. If Mr Bell had recommended it to be taken upon a lancet of gold, of platina, or of ivory, and ordered it to have been completely dried before being wrapped up, the instructions would have been deemed correct; but as a common lancet charged with vaccine virus, although wrapped up as Mr Bell recommends, will often be found in a rusty state at the end of two days, (nay I have known this change to take place in the course of 24 hours, when the virus was not thoroughly dried before wrapping it up) this mode of preserving the infection must always be used with great caution, especially as we are informed, that, by inoculating with matter upon a rusty lancet, we are often disappointed of success by producing what is called (in my opinion improperly) the spurious cowpox. See Mr Bell's Treatise, page 55.

According to my experience, the vaccine infection should never be used after being twelve hours upon a common lan-

cet, and if it be expected that it should remain even for that length of time without being injured, it ought to be carefully dried before being wrapped up, or in any other way secluded from the external air.

The mode of preserving the vaccine infection which Mr Bell recommends as the "easiest and best," appears, when considered, to be one which must often occasion disappointment to those who practise it. He says, "This," (viz. the virus as it oozes from the vesicle) "being collected on two thin plates of glass, each about an inch square, the two pieces should be laid close together when the matter is yet fluid, by which means, when the serous part of it has evaporated, the plates of glass will be agglutinated to each other. On the pieces of glass being laid together, they should be covered with tinfoil, or moistened bladder, to keep them more firmly in contact." Page 20.

It is here to be considered how much of any fluid, such as that issuing from a vaccine vesicle, can be supposed to remain between two polished surfaces "laid close together," and kept "firmly in contact" by means of moistened bladder? If any does remain, it certainly cannot exceed the merest pellicle; And even that can remain only in some accidental cavities on the surfaces of the glass plates, the rest being necessarily forced over the edges of the plates and lost; hence when inoculation comes to be performed, that operation will frequently be done with pure water in place of the vaccine infection. If Mr Bell generally preserves the virus which he uses in this way, it may account for his performing so many ineffectual inoculations, as he says he does, before he can produce the disease. See Treatise page 69.

If the vaccine virus is to be preserved upon glass plates, it ought to be done in the manner already mentioned at page

115; and I would have it observed, as a general rule, that in every instance in which it is intended to preserve the vaccine infection above one or two days, it should be dried completely, be afterwards carefully secluded from the air, and, when used for inoculation, be managed in the manner hereafter to be mentioned.

No. IX.

See page 145

THE following method of performing inoculation has long been practised by Mr Abercrombie and by myself with great success. A drop, or small quantity, of the vaccine infection, fluid as taken from the vesicle, is deposited upon the arm, at the spot where the operation is to be performed, and a number of very slight scratches or punctures are made with the point of a lancet, in the centre, or within the margin of this drop of the virus, so that the appearance of blood may just be perceived. The number of slight scratches or punctures may amount to six or eight, but they should be made so near each other as to be all included within a space equal to the circumference of a very small sized vaccine vesicle. And it is to be observed, that the more slight these wounds are made, and the less of that common inflammation takes place after them, which is the natural consequence of every wound, the more certainly does the inoculation succeed.

If the virus to be used is still fluid from a vesicle, no preparation of it is necessary ; if the inoculation, however, is to

be performed from dried matter, this is first to be rendered fluid by mixing it with a due proportion of cold water in the manner formerly mentioned at page 131; and I must here remark, that neither warm water, nor the steam of water should ever be used for dissolving or diluting the vaccine virus; for the peculiar quality of this infection seems to be of such a delicate nature as to be very readily destroyed, or rendered effete by exposure to what may be considered a very gentle degree of heat*. Of the propriety, therefore, of Mr Bell's directions to dissolve the vaccine crust in *warm water*, when about to use it for inoculation, I have much doubt, and the more especially as his success with virus derived from this source has not been nearly equal to that experienced by others: Such directions certainly were not given by me when this new mode of obtaining the virus was proposed, nor, although it be said by Mr Bell, that "the efficacy of a solution of the scab in *warm water* in producing the genuine cow-pox is farther corroborated by Mr Shoolbred," &c., do I find, that either Mr Shoolbred himself, or any of the Indian inoculators in their correspondence with him, have ever mentioned their having used *warm water* for dissolving the vaccine crust: nay, Mr Shoolbred has expressly desired the solution of the crust to be made in cold water.

If Mr Bell therefore has only sometimes succeeded in producing the cowpox with a solution of the crust (see Treatise page 23.) or has met with untoward symptoms by inoculating with such a solution (see Treatise, page 52.) it appears highly probable that these circumstances were entirely owing to his peculiar mode of operating; for the symptoms alluded to, he expressly says, "take place in some cases where the inocu-

* See Instructions of the Royal Jennerian Society. See also Mr Shoolbred's Report *ut supra*.

“ lation is performed with a solution of the scab, or crust
“ of a cowpox vesicle, in *warm water*.”

The French inoculators also, in their mode of using the vaccine crusts for inoculation, appear at first to have deviated considerably from that recommended at page 131. They reduced the crusts to a very fine powder previous to dissolving them ; and although I cannot assert from experience that by reducing them into a powder we render them inert, never having tried that experiment, yet it is certain that they obtained greater success from the solution when this previous step was omitted ; and that it was in consequence of having made this omission that the Committee was enabled to report on this particular subject. “ Qu’il a enfin obtenu un succès complet.” Vide Séance general, & . u. s. page 85.

No. X.

See page 166

IN confirmation of the above opinion concerning the mere local action of the virus of cowpox, the constitution remaining unaltered, there are now on record but too many proofs. In the Report of the Royal Jennerian Society for January 1806, it is stated, "That it is a fact well ascertained, that "in some particular states of certain constitutions, whether "vaccine or variolous matter be employed, *a local disease* "only will be excited by inoculation, the constitution remaining unaffected. Yet that matter taken from such local, vaccine, or variolous pustule, is capable of producing "a general and perfect disease." That the appearance also of this local affection has, in many instances, been such as to deceive the most experienced inoculators concerning the security of their patient against the attacks of smallpox, there cannot be a doubt; for many cases are reported by practitioners in which the symptoms of the affection at the part inoculated appeared to be so regular and perfect, that no doubt was entertained of the antivariolous process having been accomplished until the patient really suffered an attack from the smallpox. The affection produced on a child

vaccinated by Mr Powel at Chatham appears to have been of this kind. The child suffered an attack from the smallpox within a month after vaccination, yet, with infection taken from the vaccine vesicle on the arm of this child, Mr Powel had inoculated several other children, all of whom were exposed to the contagion of the natural smallpox, and were also inoculated with variolous matter without effect. See Ring's Treatise on Cowpox, page 599.

The affection produced on the child of Mr Deacon, who was inoculated by Mr Ring of London, appears also to have been merely local; for Mr Ring states that the appearance of the arm was regular, and that two or three children were inoculated from this patient. Yet this child also suffered an attack from smallpox. Med. and Phys. Journal, vol. xiv. page 404. Mr Ring also says, "Dr Nelson lately informed me of a decided case of the smallpox, in a child who had been vaccinated at the Vaccine-pock Institution, in whom he had witnessed the regular progress of the cowpox.—The case occurred in a child of Mr M'Pherson in Fitzroy Market; and I believe no one who saw it could possibly doubt of its being the smallpox," u. s. p. 404. Many other cases might be adduced, in which the cowpox affection, although it appeared quite regular at the part inoculated, yet failed to give the desired security against the smallpox; (See *Willan on Vaccine Inoculation*, page 50 et seq.) And it is also my opinion, that those vesicles mentioned by Dr Willan, (page 39,) as irregular vesicles, which have often been mistaken for the genuine vesicles, "and which," according to him, "do not *wholly* secure the constitution from the smallpox," are to be considered as mere local vesicles. For it is more consistent with physiological observations to suppose that some peculiarity of constitution should exist in those persons in whom the irregular vesicles appear, by which the constitutional affection of cowpox is altogether prevented, and by which the subsequent disease of smallpox is modified, if it

can be called modification, than to suppose that the vaccine action takes place to a certain degree only on the constitution, imparting a proportional and limited degree of security, as seems to be Dr Willan's opinion. If the vaccine action takes place at all on the constitution, I am clearly of opinion that it will be compleat; but I am also of opinion that certain peculiarities of constitution, or idiosyncracies, may exist, whereby the constitutional vaccine action may be altogether resisted at the time, and whereby the subsequent variolous disease may be modified or rendered more mild than usual; because, when the casual smallpox has been epidemic, I have frequently met with cases in which, although the person had not been vaccinated, the pustules were small, hard, papuliform, and run a course exactly similar to that described by Dr Willan, and other practitioners, as the course of variolous eruptions subsequent to, and thought to be modified by, vaccination; and such cases are by no means uncommon when the smallpox is communicated by inoculation without having been preceded by vaccination. Of certain causes operating on the constitution, so as to occasion these local or irregular vesicles, more will be said hereafter.

In order to account for those failures which have taken place in imparting the desired security against the smallpox, from inoculation with the cowpox, and which have been so frequent in London and in its neighbourhood, that this new inoculation has in that city been for sometime nearly at a stand, many practitioners have divided the cowpox into the genuine and the spurious kind; the former giving perfect security against the smallpox, the latter giving none; and to this division we must (according to Dr Willan) add another kind, viz. that produced from some irregular vesicles. "The effect of vaccination," he says, "when there are irregular vesicles, is different in different cases. They appear fully to secure some individuals from the infection of the smallpox, in others the constitution is but imperfectly guarded against

“ the smallpox by these vesicles, the disease taking place
“ after them at different intervals under a particular form.”

Page 44.

These distinctions many authors have endeavoured to establish, and to describe minutely, so as to be easily detected in practice, but, in my opinion, with little success ; for we still hear of many instances in which the practitioner has been deceived in his opinion concerning the safety of his patient, notwithstanding of the rules prescribed by those authors for forming an opinion with precision on this point. And the above quotation concerning the effects of irregular vesicles on the constitution shows the distinction made by Dr Willan to be not only useless, but hurtful in practice, because if these irregular vesicles effectually secure some constitutions, and only imperfectly secure others, how are we to distinguish whether our patient be perfectly or imperfectly protected, and to what degree ?

The terms, therefore, of spurious cowpox, and of irregular vesicles, producing imperfect vaccination, appear to me to be contrived rather with a view of explaining something not understood, than from any correct observations made on the subject, terms contrived under which the practitioner might skulk in case of failure or mistake, and the more nearly the descriptions of these said spurious and irregular vesicles are made to resemble the genuine vesicles, and the greater difficulty there is in distinguishing between them, the more effectually will this shield protect those who use it.

The term spurious cowpox, as applied to the inflammation which takes place subsequent to inoculation, and terminates in a pustule, in a creeping or spreading ulceration, or in erysipelas, is highly improper, because these affections neither in appearance, nor in their effects upon the constitution, have the smallest resemblance to the cowpox ; with equal

propriety might the effects from the prick of a thorn, from a wound inflicted with a rusty lancet, from the insertion of a small quantity of acrid matter of any kind under the cuticle, or from the bite of a leech, in some constitutions, be denominated the spurious cowpox; for from such causes will a small phlegmon with a hard base, or a degree of festering or creeping ulceration with an inflamed margin, frequently be produced, yet who that ever saw the cowpox affection, or studied the appearance of it as described by authors, would ever confound them, or class as of the same species things which, in their appearance and in their effects upon the human constitution, the only qualities by which we know them, are so very different. The instances in which these appearances take place after inoculation, are certainly to be considered as cases of failure, and as much unconnected with the cowpox as if no effect had been produced from the operation. The satisfactory proof of this is, that if the persons on whom such appearances occur be afterwards inoculated with the cowpox, they will go through all the stages of the disease in a regular manner.

Concerning the term “irregular vesicles,” as applied to those terminations of inoculation which are said to produce imperfect vaccination, I would observe, that although, in a philosophical point of view, it may not be so improper as the term spurious cowpox, yet in a practical point of view it is in my opinion also very improper, and ought not to be adopted. In the first place, the adoption of this term “irregular vesicles,” with all the consequences resulting from it, serves, as has already been observed, to screen ignorance, or inattention in the operator; for in some constitutions they are said to give perfect security, while in others they afford only an imperfect security against the smallpox. In the second place, the appearances and other symptoms attending these vesicles, are often so similar to those of the regular affection, while their ultimate operation on the

body is so very different, that we must always experience much anxiety in forming an opinion concerning the safety of our patient, if we are to judge of this very delicate point of practice from the description of these vesicles so minutely given by Dr Willan. In the third place, the use of this term leads to no view whereby we may overcome the doubt and uncertainty occasioned by adopting it ; and thus leaves us completely in the dark with regard to the most important point in conducting vaccination, viz. the forming a certain opinion concerning the extent of the constitutional vaccine action, or antivariolous process, during the course of the cowpox affection.

The introduction of the terms “ spurious cowpox,” and “ irregular vesicles producing imperfect vaccination,” have, in my opinion, therefore, done much injury to the true interests of vaccination ; and I must here, for my own part, declare, that were I, in my practice of inoculation for the cowpox, obliged to form my opinion concerning the presence and extent of the constitutional affection, and consequently concerning the future safety of my patient, from the description of the affection as given by the authors who adopt these terms, such are the doubts which these descriptions would constantly create in my mind, that however much I value this new inoculation, and few can value it more than I do, I would infinitely rather prefer at once to inoculate with the smallpox.

In consideration of these circumstances, I have long been accustomed to divide the vesicles of the cowpox into constitutional and into local vesicles ; the contents of the former vesicles being absorbed into the circulating fluids, operate a certain change upon the constitution, whereby the person becomes secure against the attacks of smallpox ; while the latter vesicles, from certain circumstances, have their action confined entirely to the part at which the inoculation was performed,

and consequently, although in many cases they are not to be distinguished by their appearance from the former, yet they operate no change on the constitution.

This division I have adopted, because I think it explains the true nature of those terminations of inoculation which are effectual, and of those which are ineffectual, and thus leads to a knowledge of a frequent cause of unsuccessful inoculation; and also because it leads to a mode of conducting the inoculation, whereby we can in every case ascertain whether the vaccine action has taken place on the constitution, and consequently can with certainty judge of the security of our patients against the attacks of smallpox.

Concerning the causes which may produce these local vesicles, (including several varieties of what are termed "spurious cowpox," and the "irregular vesicles" of Dr Willan) I would observe, that, by the existence of some peculiarity of the constitution, or of some morbid action in the body inimical to the vaccine action, the regular progress of the vesicle is disturbed; if this morbid action diminishes, or entirely ceases within a certain period, the irregularity of the vesicle will also diminish or cease altogether, and the vaccine action will ultimately take place on the constitution. But if the morbid action be severe, or continued beyond a certain period, or if the peculiarity of the constitution be permanent, the vaccine action will be entirely prevented from taking place on the constitution, and the affection (although it may advance through its local stage with less or more, or even with the most perfect regularity) will be confined to the part inoculated, and thus become a mere local affection, giving no security against the smallpox. Thus, we frequently find that the effect produced by inoculation for the first few days, has a very irregular appearance, and yet that, after a certain period, it assumes a vesicated and regular form, and that vaccination is thereby rendered complete; while in other instances, although the

appearance of the affection was at first regular, yet after some days it becomes quite irregular, and continues so during the remaining part of its course, and to such a degree as evidently to afford no protection whatever.

Although I have said that what has been called the spurious cowpox, and the irregular vesicles, are only local affections, I am well aware that they are often attended with fever, and other symptoms of constitutional excitement; but I am clearly of opinion, that these symptoms of constitutional excitement are not the effect of the inoculation, but of some morbid action in the constitution inimical to the vaccine action, and that this constitutional excitement is the cause, and not the effect, as has been imagined, of the irregularity observed in the progress of the affection at the part inoculated.

In this manner, in my opinion, are we to account for many of those failures in vaccination in affording the desired security, which are reported to have taken place, in instances in which the local affection appeared to have been perfect, or in which some irregularity took place, but which were attended with fever, or other constitutional symptoms, supposed to be those from the cowpox; for it has been found, as already stated, that after these symptoms of constitutional excitement have disappeared, if the patient be reinoculated with vaccine virus, the proper vesicle will be produced, and the proper mild constitutional vaccine action will be excited, evidently proving that the former constitutional excitement was altogether different from that induced by the cowpox.

If I am right in the above explanation of the various terminations of inoculation for the cowpox, it follows, that we should henceforth abolish the terms, "spurious cowpox,"

and "irregular vesicles producing imperfect vaccination," and substitute the following terms :

1st, *A Constitutional Affection*, when the disease is communicated from the vesicle at the part inoculated to the constitution, and the proper mild vaccine action is thereby produced.

2d, *A Local Affection*, when a vesicle is produced, the action of which, although it may appear to advance with various degrees of regularity in different individuals, is confined to the part at which the inoculation has been performed, with or without fever. And,

3d, *Failure*, applied to those cases in which no evident effect, or merely a slight degree of inflammation follows the operation, and also to those cases in which either a pustule, a crustaceous ulceration, or a festering sore takes place, and such may happen either with or without fever, or other constitutional symptoms.

From these observations it will appear, that the chief difficulty in conducting the inoculation for the cowpox, is in distinguishing the affection which is merely local from that which is constitutional, especially as it is allowed that the local affection may often be accompanied with severe, though accidental constitutional symptoms, while the constitutional affection, if the inoculation be conducted by one puncture in the usual way, frequently has not one obvious symptom of constitutional excitement to mark its presence. This difficulty, however great as it may appear to be, and important as it certainly is to conquer, will readily be overcome by conducting the inoculation according to the plan which is presently to be explained in the text.

No. XI.

See page 214

It has been objected to the test of perfect vaccination which has just been explained, that it is not fitted for general practice, because it increases the trouble of the operation, in so much, that it would require, in many cases, a second supply of vaccine matter to be procured four or five days after the first, which, in private practice, and in country situations, is not always to be ensured. See Med. and Phys. Journal, vol. viii. page 376.

It may, however, be observed, that in a matter of such moment as that of ascertaining the presence of the constitutional vaccine affection, and consequently whether a person be rendered secure against the attacks of the smallpox, trouble either to the operator, or to the patient, ought never to be mentioned. But as the operator must, in every case of inoculation, whether this test be practised or not, examine the progress of the affection many different times, in order to be enabled to judge whether or not it may have been effectual, the proper period for performing the second inocu-

lation may make one of these periods for examination, and the only additional trouble then will be, that of taking virus from the advancing vesicle, and inserting it into the other arm. They who think this too much trouble in order to ascertain the object in view, ought not to undertake this kind of practice; nor ought they, in my opinion, to be entrusted with conducting the vaccine inoculation. Concerning the objection against the use of this test in general practice, as requiring, in many cases, a second supply of vaccine matter to be procured four or five days after the first, &c.—it is an argument which is founded on misapprehension; for it has always been stated, that the second inoculation should never be performed until the vesicle from the first inoculation is so far advanced as to be equal in size to one at the end of the fifth or beginning of the sixth day, when the progress is regular, at which time abundance of virus may always be obtained from it for this purpose.

Mr George Bell, when mentioning the test of perfect vaccination which I have proposed, says, “The double inoculation was proposed as a test of the patient having upon him at the time the genuine cowpox. *When the second inoculation proves efficient, there can be no doubt that it affords additional evidence of the presence of the genuine vesicle; and were it always to be efficient, the general adoption of the measure would at least not produce any inconvenience. But the second inoculation is at least as apt to fail as the first; and a failure is known to take place in a considerable proportion of inoculations, so that many require to be inoculated three, four, or five times before the disease can be produced. It is evident, therefore, that, under these circumstances, the double inoculation must act as a double edged weapon. If it fails to excite a second vesicle, the confidence of the patient’s friends in the preventive power of this inoculation will be shaken, however much they may believe in the antivariolous influence of the genu-*

“ine cowpox; so that it is as likely to do harm on the one hand as it might on the other hand have done good, by affording additional evidence of the efficacy of the inoculation.” See *Treatise on the Cowpox*, page 69.

In answer to this objection, it is to be observed, that if it were necessary for the operator to preserve the virus from the time of performing the first inoculation until the period necessary for performing the second, either upon a lancet, or upon plates of glass in the manner recommended by Mr Bell as the easiest and best, (See this Appendix, page 103.) the uncertainty of success from the operation might, in that case, no doubt be an objection. But as virus is in every case to be obtained from the vesicle advancing on the person himself, at the very period at which it is in a state of the greatest activity, and is to be inserted immediately into the other arm, it is thought that no person, accustomed to perform inoculation, can seriously urge the above objection when called on to operate under such advantageous circumstances. In such a case, want of success from the operation may mark want of dexterity in the operator, but certainly ought not to be urged as an objection to the measure proposed: with equal propriety might blood-letting be objected to as a remedy in pleurisy, because some surgeons perform that operation with less dexterity, and often, from that circumstance, with less success than others.

But it can by no means be admitted, according to Mr Bell's statement in the above quotation, “That the second inoculation is at least as apt to fail as the first.” Mr Bell cannot have attended to the causes which produce failure, otherwise he could not have made this assertion; for it is evident that failures in producing the desired effect from inoculation arise from the following circumstances.

First, From certain peculiarities in the constitutions of the persons inoculated, whereby they are rendered unsusceptible of the regular local action of the vaccine infection. These peculiarities may operate against the success of a first inoculation, but cannot be said to operate against the success of the second, when performed agreeably to the instructions given for practising this test; because unless the person be found susceptible of the vaccine action, at least in a local manner, by the first inoculation, there can be no occasion for performing the second inoculation. The regular progress of the first inoculation, however, at the proper period for performing the second, will show that the person is not unsusceptible of the local vaccine action, and therefore, in such cases, will do away unsusceptibility as a cause of failure in the second inoculation.

A Second cause of failure in producing the desired effect from a first inoculation, and that by far the most frequent, will be found to proceed from the quality of the virus used for inoculation; for this may have been taken at an improper stage of the disease, or it may have undergone some change by keeping, neither of which circumstances can take place with regard to the virus used for the second inoculation, if this be performed in the manner I have mentioned; for the virus is directed to be taken from a regularly advancing vesicle, at a period when it is in a state of the greatest activity, and to be immediately inserted into the opposite arm.

Here, then, are two great causes which may operate against the success of the first inoculation, (viz. a permanent or a temporary unsusceptibility of the vaccine action in the person inoculated, and a change in the quality of the virus employed,) neither of which can be said to operate against the success of the second inoculation when performed in the way I have recommended; and therefore Mr Bell's position

stated above, and the objection which he draws from that position, are founded on error.

A third cause of failure in producing the desired effect from inoculation, is one which is indeed common both to a first and to a second inoculation, when these are performed by the same operator, namely, a want of dexterity in performing the operation; and to persons who find themselves in this predicament, it is recommended that, until they become more expert, they should, in place of one puncture, use the precaution of performing the operation in two or even in three different places, in the manner I have recommended at page 105 of this Appendix. By so doing, the severity of the disease will be very little if any thing increased, even although the whole of the operations prove successful, and the practitioner will find his trouble very amply repaid. I can, however, state from my own experience, and also on the authority of many other persons, that with those who have had even a moderate share of vaccine practice, such precaution, in order to succeed in obtaining the test of perfect vaccination which I have proposed, is by no means necessary.

With regard to the accuracy of this test, and the necessity of using it in practice to be enabled to judge with precision concerning the efficacy of a first inoculation, Mr Bell says, "When we meet with this," (namely, the acceleration of the second inoculation in the manner described,) "it may be reckoned *a pretty certain test of the virus having entered the constitution*; but the failure of the second or third puncture is no proof that the patient has not received the genuine vaccine disease by the first inoculation, as these punctures will at least as often fail to produce pustules as if the patient had not been inoculated before. It happens, therefore, fortunately, that this kind of test is not necessary with those who are in the practice of the vaccine in-

“ oculation; none of whom, if they duly attend to the different stages of the disease, can ever hesitate to say whether or not the infection has taken place.” See page 68.

And again, “ I believe it is generally allowed that the symptoms of the disease, and appearance of the vesicles in their different stages, are now so thoroughly understood, that *no experienced practitioner*, who attends carefully to every circumstance requiring attention, can mistake a genuine for an imperfect or spurious vesicle. Now, if this *statement be correct*, there is no necessity, on the part of the practitioner, for any additional proof of the disease being genuine.” See page 70.

It may here with propriety be asked of Mr Bell, whether the directions contained in his Treatise, and whether he thinks that the directions contained in these “ Practical Observations,” are intended rather for the use of the *experienced practitioner* than for the use of the *inexperienced practitioner*. If he considers them chiefly for the use of the former class, we might both of us perhaps, without much detriment to them or the public, have saved ourselves a great deal of trouble, and some expence, by leaving them to judge from their own experience concerning the sufficiency of the inoculations which they may perform; but if they are intended chiefly for the use of the latter class, as I presume is the case, then, as it will readily be allowed that mistakes may frequently happen with them, it certainly becomes the duty of those who profess to give instructions to such practitioners, concerning the manner of conducting this new inoculation, to point out and to explain any circumstance which can tend to simplify the practice, and more especially to recommend the adoption of such measures as are calculated to afford “ a pretty certain test,” or even “ additional proofs of the disease being genuine.”

With regard to the correctness of the above statement made by Mr Bell, however, we shall appeal to his own opinion delivered in other parts of his treatise. At page 58 it is said, "All who have had sufficient experience in inoculating
" for the cowpox, know that there is no one certain criterion
" applicable to every case, by which it can be ascertained
" that the disease has pervaded the constitution; and it is
" also known, that the surest way," (Mr Bell does not say a sure or a certain way,) "of judging of this is by minute
" attention to the progress of the pustule" (vesicle) "from
" its commencement, and being satisfied that all the principal marks of the genuine cowpox have appeared." And nearly the same words are repeated at page 66. Again, "But
" it must be confessed that some patients have been seized
" with the natural smallpox, or have received the infection
" by inoculation, who were supposed to have undergone the
" genuine vaccine disease," see page 64. And although Mr Bell is inclined to attribute these failures to inattention on the part of the practitioner, yet it is thought they may, with more truth, be attributed to the want of some proper test of the presence of the antivariolous process on the constitution during the progress of the cowpox. At page 66, and also at page 71, immediately following the above statement, we find Mr Bell not only admitting that doubts may arise in the minds of practitioners, in judging concerning the effect of inoculation, but also recommending the test of perfect vaccination, which was first proposed by Dr Geo. Pearson, to be performed in all doubtful cases.—Of this test more will be said hereafter.

Mr Jo. Pearson, surgeon to the Lock Hospital, a gentleman "whose authority," as Mr Bell very properly observes, "must always have great weight," and whose judicious observations on the cowpox Mr Bell has quoted in his treatise, (see page 30,) says, "Since cowpox produces but little disorder of the constitution, and is not attended by any eruption

“ on any part of the body, except that to which the infectious
 “ fluid is applied, it would be very desirable to have some
 “ criterion by which we could be assured that the inoculated
 “ person has undergone that inexplicable change which se-
 “ cures him against the smallpox.” See Mr Pearson’s Ob-
 servations, page 12 of the Appendix to Dr Willan’s Treatise
 on Vaccine Inoculation.

From these passages, and also from my own experience, I
 am clearly of opinion, that there must frequently occur even
 amongst experienced practitioners, but especially amongst
 the inexperienced, cases in which much uncertainty will take
 place in forming a judgment concerning the extent or suffi-
 ciency of the affection produced by inoculation for the cow-
 pox, and therefore that the adoption in practice of any mea-
 sure which offers “ *a pretty certain test of the virus having en-
 “ tered the constitution,*” or concerning which “ *there can be
 “ no doubt that it affords additional evidence of the presence of
 “ the genuine vesicle,*” is not only desirable, but necessary,
 more especially when it is allowed that “ *the general adoption
 “ of the measure would at least not produce any inconvenience.*”
 See Mr Bell’s Treatise, pages 68, 69.

Doctor Willan, after mentioning with much precision the
 test of perfect vaccination which I have proposed, says, “ This
 “ test will, however, fail if the fluid employed be taken from
 “ the person’s own arm when the primary vesicle is one of
 “ the irregular kind above described, which produces disor-
 “ der of the constitution, but affords only an imperfect se-
 “ curity against the smallpox ” See Willan on Vaccine Ino-
 culation, page 79.

If Dr Willan means by this assertion, that in cases in which
 a pustule, or a spreading crustaceous ulceration follows ino-
 culation, the test will fail, it may be answered, that these are
 cases in which it can never be necessary to apply this test ;

they are to be considered entirely as cases of failure, owing to the virus having lost its power of reproducing the disease, or owing to the presence of some morbid action in the body, which entirely prevents the vaccine action; they are cases sufficiently marked to render any test, such as that I have proposed, unnecessary. It is only in those cases, as has already been observed, in which the appearance of the vesicle is so regular at the proper period of its progress for performing the second inoculation, as to give good reason to expect that the constitutional affection will be regularly produced, that the test is to be practised in order to ascertain the actual presence of the constitutional affection. As applied to such cases, it is wished that Dr Willan would inform us whether he is still of opinion that the above assertion holds good; and if so, upon what circumstances this opinion is grounded, i. e. whether it be merely stated as a consequence of the theory which he has formed regarding the action excited on the constitution by the irregular vesicles, or whether it be a fact founded on his own experience. If the opinion be stated on the former grounds, it must be done away by the explanation which has been given above of the constitutional excitement frequently observed during the progress of irregular vesicles, and which appears to be more satisfactory than the theory of imperfect vaccination given by Dr Willan. If, however, the assertion be made on the grounds of Dr Willan's own experience, it will be esteemed highly important if the Doctor will state the circumstances of these failures by a minute detail of those cases in which they have occurred.

Various other tests of perfect vaccination have been proposed by authors and by practitioners of inoculation for the cowpox. Dr George Pearson physician to the Vaccine Pock Institution, sensible of the great difficulty which often occurs in judging whether or not the vaccine action has pervaded the constitution, by merely attending to the symptoms which

take place during the progress of the affection, proposed, at a very early period of this practice, that in all doubtful cases the patient should, after some weeks or months, be reinoculated with vaccine virus, as a test whether the first inoculation had been sufficient. See report on the cowpox inoculation, from the practice at the Vaccine Pock Institution during the years 1800-1-2, written by the physicians to the institution, page 50.

This test is founded on the opinion that persons who have gone through the cowpox, in a regular manner, are unsusceptible of it, as a constitutional disease, a second time; and this position may, so far as I know, be regarded as a general and established rule in practice. If, therefore, it be found, that a person, on being reinoculated with vaccine virus some weeks or months after a former inoculation, goes regularly through the local and constitutional affection, we may certainly conclude that the former inoculation had been insufficient; but it is by no means thought that the converse of this position is equally true, namely, that if a second or third inoculation does not produce the cowpox affection regular in all its stages, we are certainly to conclude that the first inoculation had been complete. Thus, although a first inoculation may have been merely a local affection, yet the effect produced from a second or a third inoculation may also be only local; or from certain circumstances concerning the state of the virus employed, or the constitution of the person inoculated, a local vesicle, a pustule only, or merely a slight degree of inflammation may be produced, as frequently happens in persons who never have been vaccinated, and still the patient shall be left susceptible of the smallpox. The disadvantage of this test, therefore, is, that having once doubted the sufficiency of the first inoculation, it can be only after performing many inoculations at considerable distances of time, with the same stock of virus which had produced the regular disease in others, that we can establish such a degree of con-

fidence in the effect of the first inoculation, or in the unsusceptibility of our patient to be affected with the vaccine virus, as to enable us to form an opinion concerning his security against the smallpox ; and this confidence, it is evident from the nature of the test, which is altogether negative, can only be established in exact proportion to the number of inoculations which may have been performed with active virus, as a criterion of the sufficiency of the first inoculation.

Mr Bell, in one part of his treatise already noticed, seems aware of the insufficiency of this test, and in another part of the same treatise he recommends the use of it, as affording what he conceives to be a sure test whether the person has at any former period passed through the cowpox or the smallpox. At page 66, Mr Bell says, “ In every case of this kind, in which there is reason to suspect that the cowpox has not taken place, the inoculation should be repeated immediately with fluid matter ; and if the appearances that have been already described are not produced, we may conclude, *with much probability*, that the patient has previously gone through the genuine cowpox.” This probability will, as has already been observed, be in exact proportion to the number of reinoculations which have been performed with active virus ; but would it not have been much better had the practitioner, by using the test of a second inoculation during the course of the first, been enabled to say *with certainty*, in place of “ *much probability*,” that the patient had previously gone regularly through the cowpox ? At page 71, Mr Bell says, “ If, notwithstanding the assurances of the surgeon, the patient’s friends shall have any doubt as to the genuine cowpox having taken place, or if in consequence of any unforeseen or uncommon circumstance, the inoculator himself shall see cause to hesitate in pronouncing on the real nature of the disease ; then by much the best way is, to perform the inoculation some weeks after the patient has re-

“ covered from the first ; and as I conceive a second inoculation, provided it is followed by the formation of a vesicle, at such a distance of time, to be a never-failing invariable test whether he has at any former period passed through the cowpox or smallpox ; I would even go farther, and propose that it should be adopted in every case where there can be any doubt.”

It is here to be remarked, that much ambiguity and confusion pervade the whole of Mr Bell's treatise, by his using the terms “pustule” and “vesicle” indiscriminately. In his description of the symptoms of the inoculated cowpox, the term *vesicle* is uniformly employed ; and the appearance and structure of the vesicle produced in the regular cowpox are very minutely described, and are certainly very different from the appearance and structure of a pustule. Again, when describing what he calls the spurious cowpox, Mr Bell generally employs the term *pustule* ; and although one great mark of distinction, between what is called the genuine and the spurious cowpox, appears to be, that in the former a vesicle, and in the latter a pustule, is produced, yet these terms are often used in other parts of his treatise without any discrimination ; even the plate which is given to show the appearance of the cowpox in its different stages, is titled, “Pustules of the genuine cowpox in their successive stages,” while, in the description of that plate, the term “vesicle” is used ; so that it becomes extremely difficult to say in what sense the term *vesicle* is employed in the above passage : if by the term “vesicle,” Mr Bell there means an irregular vesicle, it must be observed, that we have the authority of Dr Pearson, Dr Willan, Mr Whately, and others, to assert, that irregular or local vesicles may be produced by reinoculating with vaccine virus persons who had at some former period gone through the cowpox or the smallpox re-

gularly*; and if, by the term “vesicle” in the above passage, Mr Bell means “a pustule,” or if he regards these terms as synonymous, and that they may be used indiscriminately, then we can also assert, on his own authority, that these (viz. vesicles or pustules) are frequently produced by inoculating with vaccine virus persons who have formerly passed through the cowpox or the smallpox, and consequently that such appearances cannot be considered as a test of either one thing or another; for Mr Bell also gives a plate in his treatise, in the explanation of which he says, “In this plate are represented the appearances of the *pustule* “produced by inoculating a person with vaccine matter “who has already had the cowpox or the smallpox.” If, therefore, on the one hand, Mr Bell be of opinion that the terms pustule and vesicle are not synonymous, or ought not to be used indiscriminately, it must be admitted that he is wrong in having done so; or if, on the other hand, he be of opinion that they are synonymous, or ought to be used indiscriminately, then it must be admitted that he is also wrong in having made the above statement, allowing, as he does, that a pustule or vesicle may be produced or formed by inoculating a person with vaccine matter, whether he has already had the cowpox or the smallpox, or whether he has not had either of these diseases.

But there is still another ambiguity in this passage; it is concerning the inference to be drawn from the appearance of what is thought to be a “never failing invariable test,” for Mr Bell has omitted to mention whether he conceives

* See Report of the Vaccine Pock Institution, pages 81 and 91,—and also Willan on Vaccine Inoculation, page 40, note,—and the same observation is also agreeable to my own experience and to the experience of my colleagues at the Vaccine Institution of this place.

the formation of a vesicle, in the way he states, to be a test of the person having passed through the cowpox, or of his not having passed through the cowpox, he has left every one to explain this according as future events may justify.

Although, however, Mr Bell, in the above quotation, leaves us entirely in the dark whether he conceives the formation of a vesicle, at the distance of some weeks after the patient has recovered from the first inoculation, to be a never failing and invariable test whether the person has passed through the disease, or whether he has not passed through it; yet I am inclined to think, (from the grounds upon which this test was proposed by Dr Pearson,) that he conceives the formation of a vesicle, from a second inoculation as above stated, to be a proof that the person has not passed through the disease at a former period. Now, if this be really Mr Bell's opinion, and if, by the term vesicle, he means a regular and constitutional cowpox vesicle, according to Dr Willan's definition of that term, then we are perfectly agreed with regard to the nature of this test: Thus, if a regular constitutional vesicle be produced by a second or third inoculation, we may with certainty conclude that the first had been insufficient. But although a regular vesicle is not produced by a second or by repeated inoculations, we can only from this negative proof conclude with probability, (which probability will be greater or less according to the number of reinoculations performed), that the vaccine process had formerly taken place on the constitution. It must therefore be admitted, that in proportion as the positive proof of perfect vaccination, to be obtained by the test which I have proposed, is stronger, and is also attended with less trouble, if that should be thought of any importance, than the negative proof of the same circumstance to be obtained by the test proposed by Dr Pearson, and recommended by Mr Bell; in the same proportion is the former test to be preferred to the latter.

Inoculation with the infection of smallpox has, even lately, been proposed by some authors as a test of perfect vaccination. During the early period of the Jennerian discovery, inoculation with the infection of smallpox, was a measure very proper and necessary in order to ascertain the antivariolous powers of the vaccine process on the constitution, and thus to give confidence in the practice; these important points, however, being once thoroughly established, it is my sincere wish and hope, that then the variolous inoculation, as a test of perfect vaccination, may, from a want of infectious matter, be utterly impracticable; and I would wish it to be observed as a rule, even at present, that this practice ought not to be had recourse to, unless under very particular circumstances, and should then be used with the greatest caution, not only as it may produce unpleasant symptoms in persons on whom such inoculations are performed, but also because, if had recourse to on slight occasions, it might produce much distress, and even fatal consequences to others. For although it be generally understood, that persons who have passed regularly through the cowpox, or the smallpox, are unsusceptible of the smallpox again, yet, as we know from what has been stated above, that there are not only exceptions to this rule, but that these exceptions are more numerous than have hitherto been imagined; every known method should therefore be employed for ascertaining whether or not the vaccine process may have taken place on the constitution before this test is had recourse to. Dr Willan and others relate many cases in which the human constitution, after having undergone the full effects of smallpox infection, was still found liable to be severely disordered by inoculation, or by casual exposure to the infection of that disease in a concentrated state. Such occurrences do sometimes take place in mothers nursing their children, and in others attending on persons who are affected with the confluent smallpox; and there are instances on record, in which even the same person has been, in this manner, repeatedly and severely affected. Such

cases, as Dr Willan very properly observes, “ should warn
“ us against the indiscriminate use of variolous inoculation,
“ as a test of the correctness of vaccination, or for any other
“ purpose.” See page 72.

Mr George Bell indeed says, “ when it is not with cer-
“ tainty known, whether the genuine vaccine disease has been
“ produced, the operation should either be repeated, or the
“ patient should be inoculated with the smallpox, by which
“ complete certainty can be obtained; and, as the patient,
“ *if he has passed through the genuine cowpox*, will not be sus-
“ ceptible of the smallpox, no injury will be done by this ino-
“ culation.” See Treatise page 72. But it must be evident
that if inoculation for the smallpox be performed, as Mr Bell
seems to recommend, after a first, or even after a second ino-
culation for the cowpox, both of which have been doubtful,
the patient, *if he has not passed through the cowpox*, will
very probably be not only himself infected, but may, with-
out the greatest attention, spread the disease amongst hun-
dreds of his fellow creatures.

FINIS.

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